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pril, 1946 35 Cents Vol. 39, No. 4

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CROW-QUET?

By CARROLL E. MORSE

It was January 24, at a quarter after eight in the morning, when I saw him first—a crow in the field. I was leaving on an errand to the village. Returning a half-hour later, the sight of two crows at the same spot caused me to look for the attraction. The road passed close by the place, and as I drove along I was astonished to realize that the object of their interest was a black ball about tennis ball size. The birds were gleefully letting it roll down a bank, glassy smooth with thick-crusted snow!

Although they did not fly when the car passed, I knew that to stop would alarm them, so I continued up the hill to the house. Rushing in, I found field glasses and hurried to a window overlooking the crows' playground. Still having a glorious time, they were allowing the ball to gain a little momentum, then dashing in to stop or deflect it with wing, beak, or claw. As soon as it passed the crown of the slope and rolled too fast, one crow would fly up a few feet, drop into the little gully, retrieve the ball in his claws, and carry it back to the starting place.

I watched two of these periods elapse before a boy and his dog approached along the road and the crows took wing.

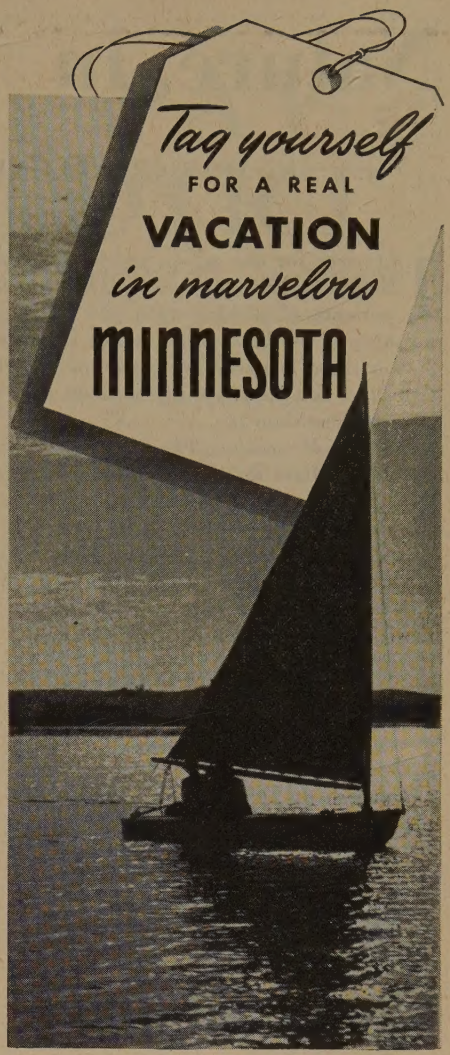
Not long after the two crows had left I looked to see if the ball might lie forgotten in the gully near the road. It was gone. But across a skim of snow, drifted in a patch on the slope, were little tracks where the ball had rolled down. Somewhere tonight, as I write, a black ball rests in a cache known only to black birds, and, maybe, the whispering pines.

Zulu Passes On

In the March, 1942, issue Mrs. Sara Menaboni told the story of her remarkable little marmoset pet, Zulu, and the article was illustrated from life by Mr. Menaboni, outstanding bird and Nature artist. Word now comes from Mrs. Menaboni that little Zulu has been gathered into marmoset heaven. He was about fifteen years old, which appears to be a truly ripe old age for a marmoset, particularly in captivity. In his last months he had acted like an ailing old man, and passed away peacefully in his sleep.

Fishery Laboratory

Opening of a new fishery technological laboratory that will serve as a "clearing house for all commercial fishery problems of a technological nature" in the New England area has been announced at Boston by the U. S. Fish and Wildlife Service. This laboratory will be equipped to carry out research in fish refrigeration, canning, sanitation, fishery by-products and fishery engineering. Joseph F. Punctochar will be in charge.



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MINNESOTA
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Nature in Print

By HOWARD ZAHNISER

IT IS rare for one whose vocation is concerned largely with Nature in print, or in manuscript, to have the evening experience of picking up a new book on the outdoors and finishing it, as the saying goes, at a single sitting. For such a person there is never any apparent uncertainty about finding time later for the reading; the book does not have to be read at once. It seldom is.

But *Last Mountains: The Story of the Cascades,* was. And no personal tribute that could be paid to this volume by Robert Ormond Case and Victoria Case seems more convincing than the simple testimony that, at the end of a busy day, it held a pair of tired eyes from half-past eight until half-past one. Perplexities, foreign and domestic, were forgotten, and what started out to be a casual first survey of a newly-unwrapped volume became an intriguing, informing, amazing, amusing, and inspiring complete reading—with a final "bed-time" re-enjoyment of sixteen superb photographs by Ray Atkeson.

The volume opens with an intriguing account of the discovery of the Cascades and their pioneer explorations, and the first thing a reader knows he has encompassed the history of this region up to now, and is facing, on page 78, a chapter on Mount Rainier with a majestic photograph opposite. Curiosity, perhaps to be called with more dignity the inquiring mind, then leads one on through informative chapters on the "giants" of the Cascades and on geology and timber resources. Gradually understanding leads into amazement.

"What, for example," the authors ask, "does a thousand *billion* board feet of lumber suggest to the average person? That was the approximate size of the original stand in Oregon and Washington. A worker in a sawmill which cuts a million board feet daily—and there are many in the Northwest—has some faint glimmering of a notion of what that statement means. It means that his 'million-a-day' mill would have to work at full capacity each day of the year, except Sunday, for *three thousand years,* to cut that many logs into lumber. . . . From the summit of Mount Rainier, on a clear day, more than a third of the nation's timber is within view."

Familiar as a general reader may feel with the Cascade Mountains, he is almost certain to marvel at the facts that the Cases are thus able to point out. Nor is the volume one merely of exciting narrative and satisfying description, for in its old songs and stories of the Indians, and in its tall tales and anecdotes of the old-timers, there is entertainment, sometimes jolly amusement. There is vicarious recreation, too, in the accounts of mountaineering, and adventure; in the accounts of hardship on these mountains. Furthermore, the book's consideration of "the effect of the Cascade Range on the economy of the Northwest" is thought-provoking, and, finally, there is inspiration in the volume for those who are interested in preserving such natural areas.

"Along in the late twenties," the Cases tell, "a company was formed to promote a cable lift to the summit of Mount Hood. Instantly it was as though a battered bugle sounded the alarm, and hidden drums began to roll. The proposal was that a tramcar carrying a hundred passengers should run from Cloud Gap Inn on the east side of the mountain, beginning at an elevation of 6000 feet, and climb to Cooper's Spur, elevation 8500 feet. At this point a forty-foot tower would be erected, with cables carried to another tower, sixty feet high, fixed on the summit. Up this cable would glide a car carrying thirty passengers, to disembark them at the top; a grandstand view of the magnificent panorama of the Cascades and the two worlds divided by the barrier. . . . Opposed . . . were a relatively small group called the Mazamas, a mountaineering club. The contest looked, at first glance, to be unequal. Money talks, and through this promotion scheme it spoke in commanding tones. But the Mazamas were accustomed to larger opponents. After an uproar that engaged the attention of the entire area, echoed in the halls of Congress, and brought out editorial comment in the *Saturday Evening Post,* the mountaineers won. The project was disapproved by the chief forester of the region. . . . 'Peaks like Hood, Shasta, and Whitney, preserved and revered as Nature made them, represent one of our greatest assets.'"

Such an example should be highly significant as such threats arise in other places, as indeed they are constantly arising. Even the Cases themselves might well have had this sort of spirited fighting for wilderness preservation in mind for their encouragement when only three pages earlier, discussing a natural park several square miles in extent "close to the base of Mount Jefferson," they wrote:

"The wonder with which lovers of the outdoors have viewed this area is always tinged with regret. Only hundreds have seen it thus far. When the thousands come, as they inevitably will, the invariable marks of 'popular' approval will be left behind; tin cans, rubbish heaps, abandoned but still smoldering campfires, and the scars left in the wake of uprooted shrubs."

It would be an injustice to allow this quotation to represent the attitude of the book toward the preservation of natural areas. Rather it is a curious thing that the volume should contain so clear a phrasing of an attitude *against* which its influence is sure to be felt. For as more people read *Last Mountains: The Story of the Cascades*—and similar books on other regions—the less likely will be an *anticipation* of regret on the part of lovers of the outdoors.

The explanation of this influence is both in the book's account of the Mazamas, and also in its own potential effect on readers.

"Over the years the Mazama Club," the Cases tell, "has added much to the understanding and appreciation of the Cascades. Members of this club were responsible for the creation and preservation of Crater Lake National Park. They have consistently influenced forest conservation, good roads, study of trees and birds; they keep records on the glaciation of peaks, and among them are members who are authorities on certain aspects of geology. . . . Certain peaks, such as Mount Hood, closely circled by a good motor highway, with well-equipped public inns perched high on the slopes, are developed for summer and winter sports with the full consent of the Mazamas. . . . Other peaks, such as Glacier Peak, austere, forbidding, usually swathed in clouds, and virtually unknown even to residents of the area, will remain a wilderness if the Mazamas have their way."

There are other such groups of well-balanced, spirited people

And Now the Fluent Earth

By LANSING CHRISTMAN

Spring fingers the frigidness
Of the creek into song again.
Hylas call; once more the lowlands
Ring with an old April chorus.
The very earth seems fluent now;
Its coldness yields. And even
If a quick hard freeze should end
These songs, or stop the rich
Mild flow, we will not mind.
There will be tender days again,
And warm south winds, and rain.
Next time the thaw will be richer;
Yes, and stronger than ever.

in other regions, and there will be more of them. The natural parks of several square miles in extent that still remain are finding their protectors throughout the country, and with the better appreciation developed through such works as *Last Mountains* their numbers will increase with acceleration. Only hundreds, to paraphrase the Cases, may have seen these areas thus far, but when the thousands come, as they inevitably will, we can at least anticipate, and prepare for, their coming with an understanding and appreciation that will not tolerate tin cans, rubbish heaps, and uprooted shrubs.

There will doubtless, of course, be other uproars that will engage the attention of entire areas, echo in the halls of Congress, and bring out editorial comment. There will, indeed, be other battles thus won against unappreciating thousands apparently in the majority, and in the meantime the thousands themselves will come to place the high value that only hundreds now see for such areas. Perhaps it will not always thus be a struggle of a minority of conservationists against a puzzled majority, but rather a triumph in which the many will look back with thanks for the relatively few who made it possible to hold what the majority really wanted. And perhaps that time is not so distant as we sometimes think, for already a large body of conservationists are gratefully recalling the achievements of this sort by *their* pioneers who were counted in tens—not hundreds.

Basic to such a development of appreciation are such works as *Last Mountains: The Story of the Cascades.* Robert Ormond Case and Victoria Case testify that they have "personally scaled some of the range's major peaks, crossed all its highways, fished most of its famous streams, and traversed its length, both sides, many times." They have obviously done their best to master the history, the geology, the economy, and folklore of the region. And they have dealt graciously with their readers. The result is a significant volume so well conceived and so fascinatingly written that it can keep a tired man from his slumbers and leave him wishing for many more such books.

Last Mountains: The Story of the Cascades. By Robert Ormond Case and Victoria Case. Garden City, N. Y.: Doubleday, Doran & Co., Inc. 1945. 236 pp., with 16 photographs by Ray Atkeson on 16 plates. $2.75.

Georgia Booklet

An attractive booklet describing and picturing the natural history, scenic and historic attractions of Georgia has been published by the State Division of Conservation, State Capitol Building, Atlanta, Georgia. It is illustrated in color and includes helpful maps.

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The New Yorker has this to say: "This will give a good case of the jitters to all backyard gardeners, as well as to all farmers, who have been playing it the easy way by using chemical fertilizers, and it will very likely send them back to the compost heap. It also proves that what you and I don't know about the art of composting not only would fill but has filled a book. The author, futhermore, can keep you up till all hours reading about the life and works of the earthworm, and that is a neat trick."

Joseph A. Cocannouer, author of *Trampling Out of the Vintage,* says: "Rodale has certainly hit the bull's eye. His conclusions pertaining to soil management are based entirely upon the fundamental laws of nature, consequently they cannot be other than sound. The book is the clarion call of a new agriculture."

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NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Entered as second-class matter May 31, 1927, at the post office at Washington, D. C., U. S. A., and accepted for mailing purposes at the special flat rate of postage provided for in the United States Postal Act of October 3, 1917, and February 28, 1925. $3 a year; foreign $3.75. Publication and Editorial Office, 1214 16th Street, N.W., Washington 6, D. C.

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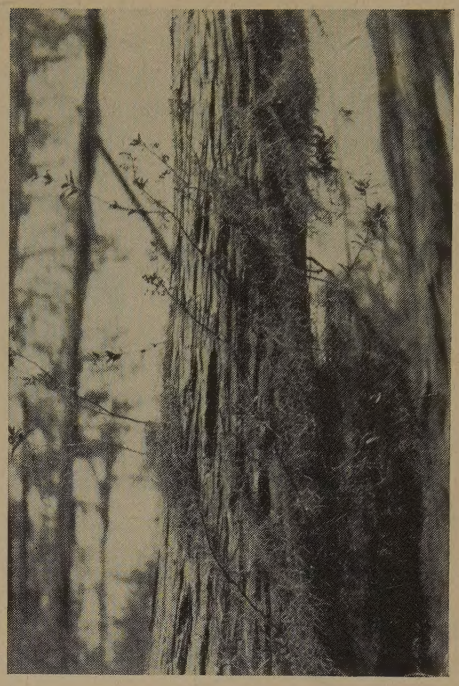
A Unique Shrub *By* WILLIAM C. GRIMM



THE accompanying photograph shows the habitat of *Pieris phillyreæfolia*, a unique shrub belonging to the Heath family, and native to the cypress swamps of the coastal plain in northern Florida and southern Georgia and Alabama. The photograph was made beside Billy's Lake in the Okefenokee Swamp of Georgia. The shrub works its way up the cypress trunks between the inner and outer bark, and, at intervals, sends out branches. As there is often no indication of the main stem of the shrub on the surface the branches appear to be outgrowths of the cypress tree itself.

On March 14, 1945, *Pieris phillyreæfolia* was in full bloom in the cypress bays of the Okefenokee. The ovoid, waxy-white flowers are about three-eighths of an inch in length and are borne in loose racemes from the leaf axils. The evergreen leaves are between two and three inches long, narrowly elliptic in outline and with margins finely toothed near the apex.

Small in his *Manual of the Southeastern Flora* places the shrub in a new genus, which he calls *Ampelothamnus*. In the Okefenokee region it goes by the common name of "he-huckleberry."

Sound Your Vocabulary

By C. E. GAPEN

NATURE, indeed, "speaks a various language" and man, who is, as he himself might say, an important part of her whole scheme, has assembled a vocabulary most useful in discussing it. The sounds of Nature are, to be sure, not confined to man, animals, birds and insects, but in this bit of word entertainment it is convenient to have one group of names those of animate things that make certain types of sounds, and another group of names of inanimate things that make sounds that go, at least in some places, by the same names.

See what you can do in hooking up the right numbers of names of living things in column 2, and the right numbers of names of inanimate things in column 3, with the names of sounds in column 1. A number of them should be easy right straight through. Not many are real hard. But if you get 15 of the 17 right in both categories you are probably pretty well in tune with something. Maybe 13 is excellent. The compiler, having an unfair advantage, really does not know. You can corroborate most of the answers in reference books, principally the dictionary. But in cases where you can not, just ask the man who owns one, or look on page 224 for the answers.

1 gurgle	1 bees	1 locomotive
2 squeak	2 goose	2 jug
3 skirl	3 baby	3 a woman's dress
4 frou frou	4 groundhog	4 winter wires
5 roar	5 sparrow	5 torrent
6 tinkle	6 eagle (Scotland)	6 brook
7 whir	7 lion	7 sewing machine
8 scream	8 wolf	8 bagpipes
9 rattle	9 cavy	9 coin (dropped on marble counter)
10 screak	10 squirrel	10 hot iron (in blacksmith's slack tub)
11 whistle	11 peacock	11 wind
12 ululation	12 cougar	12 mowing machine
13 hum	13 snake	13 wagon wheels (turning on cold, packed snow)
14 chatter	14 quail (flying)	14 pure tin (when bent it "screams")
15 sibilation	15 wood thrush	15 door
16 twitter	16 humming-bird	16 your automobile
17 bark	17 seal	17 pistol

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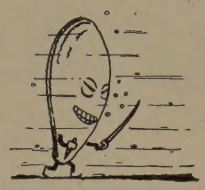
BELL TELEPHONE SYSTEM

Contents Noted

ACCUMULATED medical evidence appears to leave little doubt that one source of the spread of infantile paralysis is human waste, in which the virus of the disease is resident. This waste goes into our streams and rivers, polluting them and carrying the menace along. Many epidemics have been found to exist in the vicinity of badly-polluted streams, near and along which flies breed, flying away farther to spread the dread polio. There is, to be sure, much that is not known about poliomyelitis, but it certainly seems conclusive that pollution of waters is a serious factor. Yet the Congress of the United States, for reasons of politics, administrative jealousies, and pressure, still refuses to enact a law that will really force municipalities and industry to clean up the situation. Marching with our dimes against polio is not enough; polluters must be made to march with their dollars. They have no right to condemn thousands of children annually to death or life as cripples.

FILE under the heading of high sport a report sent in to the sports editor of *The Mobile Register* by one of his feminine correspondents, Mrs. Tommie Allen of Jackson, Alabama: "Thursday morning when I got up and looked out the door there was a big buck standing by our gate. He had come up with our cows. I turned and told my husband, and he got his gun and stood in the bedroom door, in his sleeping clothes, and shot the deer. That was really something—and the last day of the season, at that. The buck had only three points, but he was certainly a fine, fat buck and big, too." We have always wondered just why they call it the "deep" South.

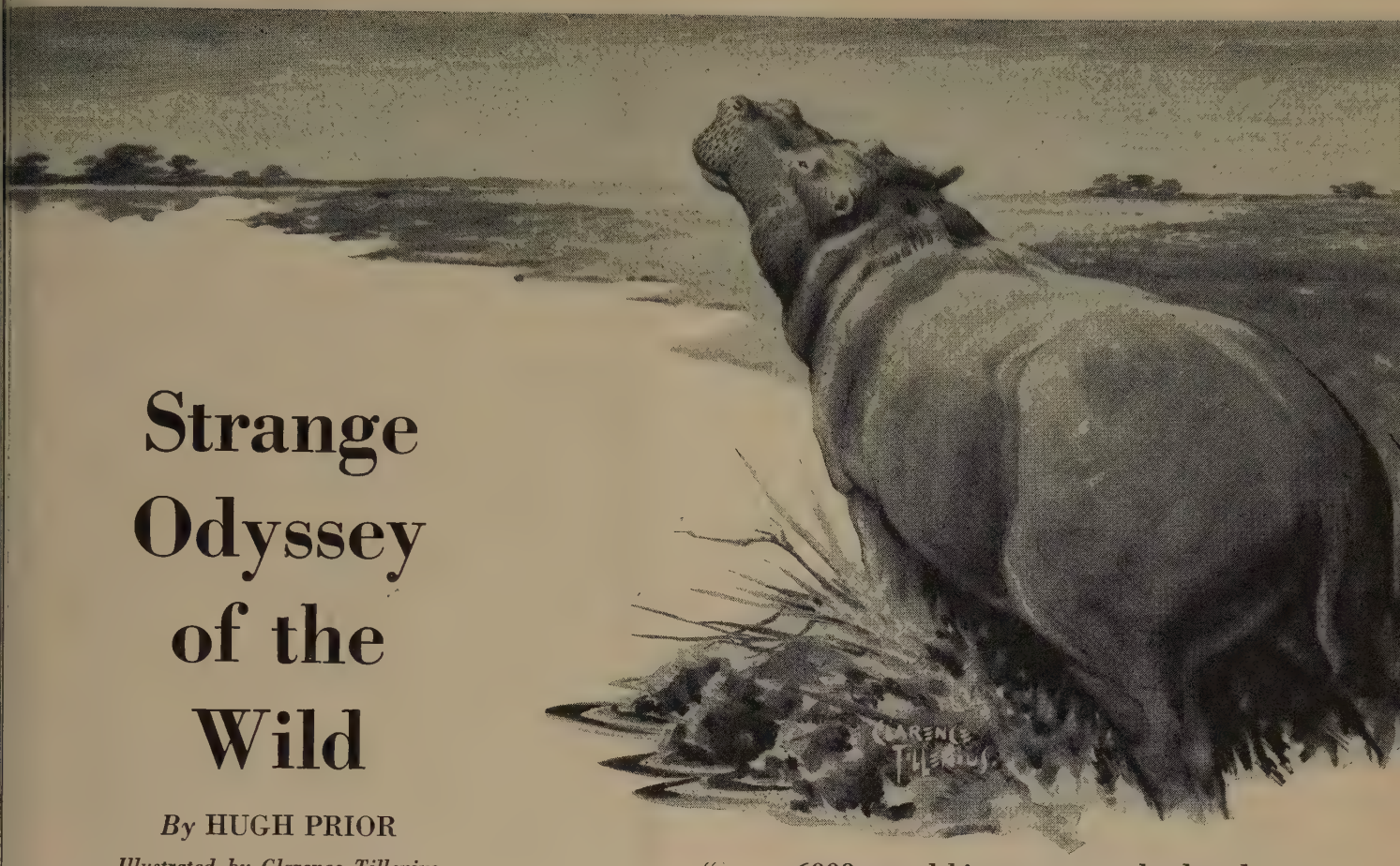
JUST when we thought the Japanese situation was well in hand, our complacence is disturbed by the Fish and Wildlife Service, coming with a warning of another Japanese menace. This is the Japanese seed oyster. Oyster people on the Atlantic and Gulf coasts are warned not to allow planting of these seed oysters in their waters. On the Pacific Coast a substantial industry has grown up through this sort of alien introduction. The Jap oyster grows big quickly and is popular for canning, although it does not look or taste as good as native oysters. And along with the seed oysters comes a fifth columnist, the dread Japanese oyster drill, a species of snail that plays hob with oysters. If this Jap bivalve were planted on the East coast, we are warned, it would outgrow and possibly replace the native species. Stand by to repel the invaders, boys, oyster forks at the ready.



ANNOUNCEMENT of five thousand dollars in cash awards for the best conservation pledges of thirty words or less is made by the hunting and fishing magazine, *Outdoor Life*. In making the offer, and stating the rules of the contest, the magazine points out that "preservation of our natural resources is vital to the future of this country and to our American way of living." There is no doubt of that, but we would not place too much confidence in any combination of thirty words as the solution of our problems in conservation. If we were to put any words together they would include self-denial, facing the facts, and consideration of the other fellow. And, somehow, we find some of the titles of articles in the issue of *Outdoor Life* in which the contest is unveiled rather un-preservation-like. These include: "Record Moose—as an Afterthought," "The Idea Was to Hunt Rabbits," "Slow Up to Down Bucks," "Bear Hunt in Dismal Swamp," "Build This Wall Rack for Your Guns," "Go Along on a Maine Duck Hunt." Eating your cake and having it, too, is still the neatest trick of the week. And, we repeat, the word preservation means "the act or process of preserving, or keeping from injury or decay." Certainly *Outdoor Life* has no such goal in mind.

THERE may be those who will regard "Strange Odyssey of the Wild", the leading article in this issue, as fictional. Actually the story of the wandering of Hubert, the hippo, is true. The author, widely known as a writer on wildlife, was for many years a resident of East and Central Africa. He first came across Hubert's story when he met James Cruickshank, a Zululand planter, who had kept a careful record of the hippo's progress, which was liberally reported in the press at the time. Hubert's trip was, indeed, a strange odyssey. R. W. W.

SOUTH AFRICA
TUGELA RIVER
ZULULAND
WARNING! 'WARE HIPPO!
STANGER
DURBAN
NATAL
CABBAGES KEEP TO THE PATH
SEA COW LAKE
DURBAN
Join the NAVY AND SEE THE WORLD
POST NO BILLS
THE TEMPLE
PONDOLAND
TRAPPIST MONASTERY
HONEYMOON CREEK
CAPE PROVINCE
INDIAN OCEAN
EAST LONDON
CLARENCE TILLENIUS



Strange Odyssey of the Wild

By HUGH PRIOR

Illustrated by Clarence Tillenius

". . . a 6000-pound hippopotamus clambered out of the muddy waters of the bay . . ."

RICHARD'S BAY, in the heart of sunny Zululand, is not known to fame. Yet somewhere on its reedy shore there is a spot that merits a place in the mystic annals of the wild, for there began the strangest journey ever made by a denizen of the jungle lands of Africa.

One white African day, when the thunders of the first world war were rumbling to silence, a 6000-pound hippopotamus clambered out of the muddy waters of the bay and stood on dry land. His big, ugly snout swung in a slow, questing arc. Then, as if drawn by some magnetic force, it stopped when it pointed south, and the stumpy legs began pounding the veld. Thus began a world's record marathon amble—a trip that was to cover half of Zululand, all of Natal, the whole of Pondoland and half of Cape Province.

That mysterious journey was to last for no less than two and one-half years. It was to cover approximately a thousand miles of African veld, at a languid average of a mile a day. This was not a particularly wearing pace, but one easily associated with the under structure of the huge amphibian.

What remote atavistic instinct stirred in that hippo's dark brain, to send him a-roaming down nearly half a continent? And in quest of what? Wanderlust, in the broad sense, is certainly not a hippo characteristic. And that strange odyssey is without parallel in hippo history—a trip that intrigues the imagination.

Not the least remarkable feature of that hippo's unexampled adventure into the far lands of Africa is that, once he left his native haunts, he was gradually drawing away from true hippo country, for hippos love the heat, the mud, the swamps and reedy inlets of tropical rivers and lakes. Of course, as he wandered ever farther south, he ran across rivers and lakes that offered him plenty of water, some of it just as murky and swampy as that of his home in Richard's Bay. And since a hippo can live on any kind of green stuff, even the toughest of weeds and grasses, he found plenty of provender to fill his capacious interior. And a frosty climate is not usual in any of the provinces through which he wandered. Yet, whatever unhomelike conditions he found, he allowed them in no way to interfere with his pre-determined journey.

This ambling hippo first swam into notice by crossing the Tugela, the great river that forms a flowing boundary between Zululand and Natal, South Africa's garden province. He had then put half of Zululand behind him. That fact alone was enough to attract attention to him. And it did—a casual attention, it is true, but the beginning of the fame that was soon to be his.

Natal's quivering blue horizon lay ahead, to the south. He pounded on, and soon reached the vicinity of the big town of Stanger. On the outskirts of the

town stood a large field of sugar cane. This attracted him, and there he feasted in the hippo way, laying waste ten times more than he ate.

That succulent plunder was the beginning of real notoriety for him. The local press treated the theft, and the cane owner's wrath, with equal levity, and for some obscure reason tagged the wanderer with the inappropriate name of Hubert. His immediate past was dealt with at length, and his future movements made the source of imaginative speculation. Papers in outlying towns took up the story, and thereafter his movements were recorded like those of a visiting celebrity.

Without hostile attention Hubert took scores of towns, villages, settlements and farms in his southward waddle. After long weeks he reached the vicinity of Durban, where he gained renewed publicity by devastating a large part of a field of cabbages belonging to a group of Hindoo market gardeners. With a cavalier disregard of the wild-eyed Hindoos' shrieking objections, Hubert completely filled the inner hippo, then waddled to Sea Cow lake, on the Umgeni River, near the Durban city limits.

While placidly enjoying himself in the lake, Hubert suddenly found a large part of the world buzzing about his inoffensive ears. Attracted by the newspaper stories, curious crowds from Durban and the surrounding district began motoring daily to the lake to view the Columbus of Hippodom. Hubert did not seem to mind, although once, when a camera man ventured too near for a close-up, he did give way to irritation. The result was a slightly-nipped but badly frightened photographer.

Worse, however, was to come. The authorities of the Johannesburg Zoo, considering the rover fair game, essayed to capture him. Others, with interests in the show game, offered rewards for his capture. All of them tried hard, but Hubert was too much for them, in more senses than one. His big foot was on free soil, and he meant to keep it there.

The attempts, however, had happy results for Hubert. The Natal Provincial Council, possibly realizing his publicity value, proclaimed him a ward of the Province. He was not to suffer let or hindrance, much less physical violence, wherever he chose to roam. The proclamation was no light boon for the three-ton hobo, for it carried with it the freedom of Natal's highways, byways and waterways.

Hubert stayed a few more days in the lake, then decided to pay his respects to the city before leaving.

His choice of approach was masterly. It was by way of a leisurely saunter through beautiful Victoria Park, justly the pride of the city of Durban. From the park he ambled casually into West Street, Durban's main thoroughfare. No back streets would do for a government guest of his proportions.

The people, at a respectful distance, stared at the incongruous spectacle of a great jungle denizen peacefully strolling through the heart of a modern city. The police, mindful of the government's proclamation, scratched puzzled heads and regulated traffic to suit the whims of the massive visitor.

Of all the vehicles thronging West Street only one interested Hubert. That was a ricksha, lying idly at the side of the street. Lurching up to investigate, he poked his great nose inside, where lay a slumbering Zulu puller. Hubert's rough neck scraped on the side of the light vehicle and his big nose wrinkled in an interrogative sniff. In a fraction of a second the most wide-awake native in all Africa was sitting up.

After one horrified look at the terrible apparition, whose snuffling nose was but a few inches from his own, the Zulu, with a yell like a steam whistle, fairly flew from the ricksha. His naked feet barely touched the pavement as he raced away, convinced that some

"The man with the soul of a vandal hurried up to view his handiwork. Hubert was dead. His strange odyssey was over. And all South Africa mourned."

monstrous demon was close at his heels, and gaining.

Hubert lumbered hastily back, then lurched slowly away, to spend the night in the dark waters of the Umgeni. Next day he left Durban. On his way he stretched his waterways privileges a bit, climbed the heights to the Pinetown waterworks and rolled in. After a joyous hour or two in the sparkling waters of the reservoir he climbed out and resumed his southward journey.

If he was received by whites at towns and villages with curiosity, interest and amusement, Hubert's appearance at native settlements was invariably the signal for a great hubbub. The natives did not regard him as merely a wandering hippopotamus. To them he was the reincarnation of some great departed chief or rainmaker. Wherever his approach was heralded, by press or runner, noisy and excited meetings were held to determine the proper methods of receiving him. Some were fantastic. But Hubert met them all with his usual dignified sangfroid.

Still more impressed and thrilled were the superstitious Indians. This strange visitor was a god, they insisted. And a god of no ordinary stature and power, else why had he chosen to materialize in so mighty a bulk? In support of their belief they pointed to the impression he made on white men wherever he went. And had ever another hippopotamus been known to desert his reedy home and mingle with men in villages, towns, and even cities?

Then, at one of their large settlements, Hubert himself confirmed their belief. Waddling ahead unconcernedly as usual, he ignored the gaping crowd that lined the way, and for some reason—or none, more likely—went straight to that sacred building of theirs, the temple, which stood in holy seclusion apart from the other buildings.

The Indians were filled with awe. For them the matter of Hubert's divinity was now settled beyond all doubt. Appropriate ceremonies had at once to be arranged. While Hubert was snuffling and poking around the temple they hurried away and slaughtered a lamb, as an appropriate offering to the visiting god-incarnation. They got a severe setback. For Hubert, the strictest of vegetarians, spurned their blood sacrifice, and forthwith turned a broad and scornful beam on temple and settlement.

Hubert had now reached the front pages of nearly every newspaper in South Africa. He was news, the kind of news that kept front pages always open. Correspondents all along his route kept the wires humming with bulletins recording his daily movements. Wherever people met, he and his as yet unrevealed objective were subjects of animated argument and conjecture. And, since his undeviating southward course seemed to point to some kind of goal, there were all sorts of guesses, arguments, theories, mixed with the more or less authoritative dicta of big game hunters who knew the hippo and his ways—although they were willing to admit that they knew him only in his native haunts. So widespread was his notoriety that Hubert achieved even the unique distinction of a poem all to himself in the pages of London *Punch*. The freedom and the rights conferred on him by Natal were gladly accorded him by Pondoland and Cape Province.

No longer altogether jocular, the papers began to speculate seriously about his objective. Few now doubted that so sustained and oriented a trip had a definite objective. Curiosity on that point became so strong that concern for his safety began to be voiced. One paper urged railway men to watch their tracks to avoid the risk of hitting him. To which the railway men replied dryly that Hubert's 6000 pounds of potential obstruction were safeguard enough for him.

Southward, ever southward, he wandered. Beyond helping himself to the odd few hundredweight of cabbages, or other green stuffs cultivated by men, Hubert had damaged nothing on his way. No one, native or white, feared him. He had not given anyone cause to fear him, in spite of the huge jaws he possessed, jaws that in the water could cut a boat in two or chew up a human body. He came to be regarded with a kind of mass affection, because of the gentleness accompanying, and perhaps emphasizing, his tremendous physical power.

In countless small places Hubert's coming was eagerly hoped for, since a visit from him put all sorts of small towns and villages, hitherto unknown, at least temporarily on the map.

Hubert, apparently, had no narrow sectarian views. He had visited Christian whites, heathen natives and Indian Buddhists. Was it a thirst for a wider knowledge of man's divergencies that led him one day to visit a Trappist monastery?

First he paid the monks the compliment of sam-

Vernal Equinox

By CHAS. EDGAR GILLIAM

Last night the hungry, muling moon
Began to suckle on the old,
And winds unplucked a haunting tune,
Now warm, now cold!

Above the storm wise cohonks spoke
The password to the polar rain,
As they nosed scuds aside and broke
Nestward again!

At dawn hares skipped the coverlet
To stamp the melting lace away
From brave arbutus leaves, and let
The buds see day!

They knew how Beauty and how Truth
Grow over fetid weed and breath,
How Winter bows to Spring—how Youth
Rises from Death!

While Man alone each sap-swept spring,
With laughing love and loving tears,
But half awakes from vain dreaming
Of ending years!

pling their cabbages. In contrast to the vociferous Indians, the men of silence watched him lunch in what he took, no doubt, to be mute approval. That may have aroused Hubert's curiosity. For, his hunger allayed, he waddled from the trampled field to the monastery itself.

For a long time he lurched around the buildings. What he learned there was known to Hubert alone. But his next move was significant. When he left the monastery he turned, for the first time, off his southward course, to seek a reedy sheet of water bearing the name of—Honeymoon Creek! This, of course, may have been no more than a coincidence.

After a couple of weeks in the creek he took to the southern trail again. But the newspapers discovered where he had spent those mysterious two weeks. And they rubbed it into Hubert. They hinted that a close-up of mass celibacy had awakened his conscience and aroused matrimonial stirrings in him, and accused him of something like ulterior motives. It may have been so; but there are no hippos, male or female, in Honeymoon Creek.

It is not likely that Hubert learned of their wise-cracking, or that he would have resented it if he had. But it is a fact, as soon as their chaffing began, he suddenly and mysteriously disappeared into the hinterland. For the first time since he left Zululand his whereabouts was unknown, and remained unknown for several weeks.

Then, as suddenly as he had vanished, he reappeared, ambling southwards as unconcernedly and purposefully as before. Boer farmers, unlike the hysterical Indians up in Natal, willingly gave him the freedom of their cabbage and corn fields.

He made brief calls at the coast towns of Umzumbi, Anerley and Port Shepstone. He stayed nearly half a day at Port St. John's, and then lumbered away, as always, to the south.

At every point on his journey down Cape Province his reception was as warm as it had been in Natal and Pondoland. And speculation as to his final objective grew with each day's journey—that is to say, with each mile he covered.

Soon it became clear that he was headed for East London. When the news was published the city was agog over Hubert and the mysterious quest that was bringing him nearer and nearer to their city. Would his arrival there solve the mystery of his two and one-half years' pilgrimage? Would he go farther south? Would he turn homeward, avoiding the increasingly chilling South for his warm and reedy homeland? Would he—well, what would he do? Whatever goal he had in view, it must be near, for, after all, there is only one South—then the ocean.

East London could not help wondering where Hubert was going, and why. But East London had a warm welcome ready for the big, dark Zululander. The city had, but . . .

The sun was journeying down the westering sky. Lengthening, tree-flung shadows began to creep across Hubert's path. It was time to look for a resting place in some grassy dell. Hubert sought only comfort. Protection he felt he did not need.

He found the place he sought, just a thicket that would satisfy his age-old instinct for concealment. Before entering, he glanced around. No animal was in sight; no living thing at all, but the man who stood so still, slowly raising a rifle to his shoulder. No harm there. Hubert was the friend of all men. All men were friends of his.

As he turned his head away the rifle cracked. Hubert stiffened, lurched, then slowly sagged down and lay still.

The man with the soul of a vandal hurried up to view his handiwork.

Hubert was dead. His strange odyssey was over. And all South Africa mourned.

Maybe Hubert's big, dark, wandering ghost still plods over the silent night veld, dreaming over the mysterious quest that was not to be fulfilled.

★

Apology in a Rain-drenched Orchard

By E. V. GRIFFITH

Forgive me, Lord, if it is wrong
To worship loveliness like this—
Drenched by the recent silver shower
How beautiful the world is!

If it is sacrilege to stand
And feel the cool spring breezes blow
Clean scents of apple bloom about.
Forgive, I do not mean it so.

Nor think it wrong to breathe my fill.
The scent of blossoms in the rain.
When earth is renovated, pure,
May never, never come again.

Checking on one source of flood waters. Snow surveys determine the water content and reveal what may be expected in case of sudden thaws. This information is of value to those preparing for flood and to the users of water for power and irrigation.

U.S. FOREST SERVICE PHOTOGRAPH

Rampant Rivers

By EDNA H. EVANS

THE phrase "river, stay 'way from my door" is more than just a song title to people who live in areas subject to floods.

Instead, it expresses their fervent hopes, for, when Old Man River goes on a rampage, he is no respecter of property rights. He rises up over his banks and spreads himself over thousands of acres of land, impartially flooding mansions and share-croppers' cabins, mighty industries and crossroads stores, thoroughbred stock and wild creatures, fertile acres and waste land.

Technically speaking, a flood is a temporary unbalance of Nature that results when more water is supplied to the land, in the form of rain and melting snows, than can be absorbed by the land itself and its vegetation, or retained in natural and man-made reservoirs.

Actually speaking, a flood is one of the most terrifying aspects of Nature, comparable to hurricanes, tornadoes, tidal waves and earthquakes. But, unlike these other disasters, a flood reaches its peak more slowly, and its effects last longer. Of course, in the case of flash floods of the West, the crest sweeps swiftly out of a canyon and is soon gone. But, in floods over great river basins, it may take several days for high water upstream to reach the lower part of the river. Hurricanes approach rather slowly, too, but they move on, while the flood waters remain for days and weeks.

As the flood sweeps down from the headwaters, anxious eyes watch the river rise higher and higher. Inch by inch the swirling water climbs up the river gauge. Now it passes the level that marked the crest of last year's flood. Now it approaches the mark that formerly represented the all-time high for the river.

Will the waters never stop rising? Will the levees hold? Can the dams keep back a part of the swirling, muddy waters? Can any barrier, natural or man-made, withstand the pressure of that roaring torrent?

There is a relentlessness in all the wilder aspects of Nature—in the whirling cone of the tornado, in the greater sweep of the hurricane, in the sullen rumble of the earthquake. Man has mastered many forces on this earth, but he still stands helpless in the face of floods, storms and earth tremors.

No power in the world—not even the atomic bomb—can break up a hurricane. No power can keep the rain from falling. But man can control the courses through which the rain-fed rivers flow. Of course even this control is not infallible. Levees will break. Dams will go out. Rivers will leave their old beds and cut entirely new ones for themselves, regardless of political or property lines.

While he cannot control them, man has learned to anticipate hurricanes and freezes. He knows when weather conditions are ripe for forest fires, and he also is able to forecast floods.

The U. S. Weather Bureau has maintained a continuous flood forecasting service for the larger rivers since 1890, when it was authorized by law to have charge of the "gauging and reporting of rivers." In its present setup, the service is administered through more than eighty Bureau offices, which are designated as river district centers. Each of these offices is responsible for the observation of river stages and precipitation within the river basins in its district. Today the service covers all of the principal rivers in this country, and provides comprehensive warnings.

There is nothing very spectacular about the flood forecasting service. The job of predicting floods consists of painstaking accumulation and analyses of data from regular weather stations and from part-time observers. Often communication failures from outlying districts at critical times force the forecaster to rely heavily on his own personal judgment rather than on actual facts and figures.

Flood forecasts for the lower parts of large rivers can be based on the prevailing stage at some point upstream. But, in headwater areas and on shorter streams, the flood forecasts must be based on actual rainfall measurements. In the North run-off from melting snows also must be taken into consideration, and so must the changes in ground surface conditions that affect the amount of water the soil can absorb.

Certain definite signs indicate to the weatherman when the stage is set for a flood. In the late winter and early spring the ground soaks up all it can of the melting snow. Deep frost in the ground, however, may speed up run off along with the rain that often falls at this season of the year. More and more water pours into the streams and rivers.

At the gauging stage on the river bank observers watch the slow, steady rise of the water level. The flood forecaster keeps in close touch with the general weather forecaster. Observers at rainfall reporting stations send in their totals every six hours. On these figures, as well as on his knowledge of the soil and character of the river basin, the flood man bases his forecast.

When he is certain the crest will be a high one, alerts are sent out. Residents on low ground are advised to seek refuge on higher locations, taking along their livestock and portable valuables. Relief agencies begin their preparations and rescue parties are organized. Extra workers are called upon for service on the levees, and they stand ready to add sandbags and reenforcements wherever the waters may threaten to eat away the embankments.

After the crest of the flood has passed there is a period of waiting for the waters to recede. The homeless must be fed and cared for. Families marooned in flooded houses, and livestock perched on barn roofs, must be rescued. There is plenty of mopping up to do. Homes must be repaired or rebuilt. Debris must be cleared away. Roads, bridges and railroad tracks must be replaced. Mosquitoes and other disease-carriers must be fought in the warm areas, and polluted water supplies must be purified.

Floods are by no means rare occurrences. They happen with seasonal regularity in some parts of the country, and at more scattered times in other areas. Actually, there is no real flood season in the United States, although the newspapers usually play up the spring floods in the Ohio and Mississippi valleys.

However, studies conducted between 1924 and 1937 showed that, of the hundred and sixty-eight months included, only fifteen months did not find some locality experiencing a flood of damaging proportions. Monthly losses amounted to $8,515,000 and seven lives, while the yearly property loss averaged $102,182,000, and the annual toll of lives was ninety.

Since plants and animals alike depend on rainfall for their very existence, no one would be foolish enough to want the rain to stop falling or the snow to stop melting. All fertile river valleys—from the Nile to the Mississippi—have been built up by flood waters. But, on the other hand, hillsides have been eroded and top soils covered by worthless sand. Rampant rivers can both give and take away fertility.

Why do people continue to live in areas subject to flood? The answer is simple. Since the days before recorded history, man has tended to settle in river valleys, where the fertile soil provides him with abundant crops. But, ever so often, the river benefactor becomes a destructive monster, snatching away his gifts and leaving hunger, desolation and death in his wake.

Naturally, floods have made a great impression on mankind. There are flood stories to be found in the legends, histories and religions of many races. The

The Mississippi River is noted in history for its floods. Since the disastrous flood of 1927 much work has been done in control. Here is shown improvement dredging in the vicinity of Wyanoke, Arkansas.

Denuded lands are great contributors to flood waters, which carry off the topsoil and the subsoil as they rush to the rivers. Soil conservation by planting of trees and other vegetation mitigates such destruction.

Hebrews had their Noah and his seagoing menagerie aboard the Ark. Other ancient civilizations of the Near East had their flood legends, too, and archeologists have found traces of what may have been the flood of Biblical record in alluvial deposits on the plains of Mesopotamia.

The Greeks told of Deucalion and Pyrrha, who alone survived a population-destroying flood. They repeopled the earth by casting stones behind them—stones that turned into better-behaved citizens than their predecessors. Flood legends are found in the New World, too. The Western Hemisphere Noah and his wife owed their lives to a refuge in a huge tree rather than to a trip aboard an Ark.

The Nile River, with its annual inundations, loomed large in the lives of the ancient Egyptians. Without the annual flood, which brought deposits of rich soil for the river valley farms, the land was faced with a famine. Indeed, Egypt was the gift of the Nile, and without its life-giving floods the kingdom of the Pharaohs would have been no better than the desert lands that bordered the rich banks of the river.

To those Nile floods modern civilization owes the beginning of engineering, surveying, mathematics and other sciences, developed by the Egyptians in order to find their lands again after the floods had obliterated all landmarks.

Farther east the Babylonians learned to control the waters of the Tigris and Euphrates Rivers by means of canals and ditches. Still farther east and at about the same time—some four thousand years before Christ—a Chinese engineer was elevated to the emperor's throne because he was able to control a flood and save the land from the sea.

In the United States, which now leads the world in engineering and flood-control projects, rampant rivers early made their appearance in history. In 1541 Hernando de Soto, discoverer of the Mississippi, experienced flood times on the river, and the historian who accompanied his expedition wrote the first description of a Mississippi River flood. That sixteenth century flood began in March and reached its peak forty days later, with inundated areas extending for twenty leagues on each side of the river.

During the Revolutionary War, George Rogers Clark led his expedition through the "drowned lands" of Illinois to capture the British posts of Vincennes and Kaskaskia. The picture of a tall soldier of the expedition wading through the flood waters with a small drummer boy on his shoulder has long been a favorite one in history books.

As early as 1727 New Orleans had a levee 5400 feet long on the city front to protect it from high water. Eight years later the embankments stretched along both banks of the river for thirty miles above and twelve miles below the city. By 1812, when Louisiana was admitted to statehood, levees on the left bank ran as far north as Baton Rouge, and those on the right bank to Pointe Coupee.

Early levees on the Mississippi were privately constructed. But, since it was useless for one planter to try to protect his land if the landowner upstream did not, the problem of levee construction soon became the affair of the states and the nation.

Many of the most recent features of flood control work on the Mississippi were adopted as the result of the 1927 flood, which was the most dangerous on record. For the first time in history the waters rose over the seasoned levee works constructed according to standards set by the Mississippi River Commission.

The flood began in April, and, before the waters went back to normal, six weeks later, they inundated 20,000 square miles of territory in six states. Property loss was set at $270,000,000; 600,000 people were made temporarily homeless and several hundred were drowned. Livestock and poultry drowned by the flood waters numbered more than a million and a half animals.

To prevent a recurrence of such a disaster, long hearings were held by the flood control committee of the House of Representatives. Surveys were made and finally a plan, submitted by the chief of engineers,

was adopted extending national assistance unprecedented in the history of the country's flood control work.

Since 1928 about 725 million cubic yards of earth have been placed in the levees, a total that represents more than twice the amount of earth moved in building the Panama Canal. The levees have an aggregate length of 2000 miles and are the most extensive structures built by man in the history of our race.

Because of the importance of rivers and harbors to the nation's military safety, these have always been under the control of the War Department. Thus, to the Army Engineers has gone the problem of flood control on the nation's great river systems.

In addition to building some forty-five flood control dams, plus more than a hundred local protection projects, the Engineer Corps has used the lower Mississippi valley as a full-scale laboratory in which to test and apply practical flood control methods.

At the Waterways Experiment Station, located at Vicksburg, Mississippi, problems concerning waterways and harbors are solved by careful studies of their replicas in miniature. If the station wishes to study some particular stretch of river, a small model of that river is built to scale. Measured quantities of water at rates proportionate to the actual flow are discharged through it and the model is adjusted so the actual river is reproduced. The proposed works or improvements are placed in the model and, if they have a satisfactory effect on the miniature river, their successful use on the actual stream can be anticipated.

But the Mississippi is not the only river on which flood control measures are used, or in which the Engineer Corps is interested. Flood-control dams are to be found in many parts of the country—in the East, middle West, far West and Southwest. Wherever there are rivers to overflow their banks, there is the need for controlling their rampages.

The Ohio basin is another region to receive great attention, for in it is to be found one of the highly-developed industrial areas of the nation, as well as some of the richest mining country and the most fertile fields. Its scope embraces parts of fourteen different states, and property damage from floods ranks higher in the Ohio basin than in any of the other major river basins in the country.

Average annual rainfall in the Ohio valley, according to Weather Bureau records, is forty-four inches—higher than any other major subdivision of the Mississippi system except the lower alluvial valley. Flood stage is reached or passed at some point along the Ohio virtually every year, while damaging floods have occurred thirty times in the last sixty-four years. In the 1937 flood alone, property damage in the Ohio valley totaled $400,000,000.

On the other hand, the St. Lawrence is said to be the best regulated river in the world. Its good behavior is due to the Great Lakes, which act as a vast storage system at its source. With those great natural reservoirs to regulate the amount of water it receives, the St. Lawrence cannot help being a well-behaved river.

Holding back the water by means of dams after the rain has fallen is only the immediate and direct approach to flood control. The U. S. Forest Service takes a deeper, more basic approach to the problem.

Water that falls from the clouds, or comes from the melting snow mantle, and rushes directly into the streams and rivers, does little good to the land. Indeed, in its hurry to get to the sea, that water may sweep along with it grains of sand, rich loam, pebbles and even great boulders.

Aim of the Forest Service in its flood-control work is to arrange so that at least a portion of that water is retained long enough so the crops, the forests and the vegetation in general can make use of it. The Service does not claim that forests can prevent floods, but it does believe that forests are one of the beneficial influences that can be brought into play in the larger program of flood control.

During the last three centuries millions of acres in this country that were once covered with trees, have been cleared. Vast areas of grasslands have been plowed. Some of that land was not suited for agriculture. Other areas were worn out by poor farming methods and abandoned. Before more grass or trees could grow, the forces of erosion stepped in. Great gullies were eaten in the hillsides. Top soil was washed away. Sand and pebbles were spread over soil that formerly was fertile, thus making two useless areas where one was before.

By use of artificial rain-making machines, the Forest Service has conducted tests and found which types of cover are best suited to (Continued on page 218)

What Can I Say of April?

By COSETTE MIDDLETON

What can I say of April that has not
Been said a million, million times before?
Her dawns are portraitures in apricot
And coral—has that thought occurred to more
Than me? And when the shadows straighten up
To stand in tall allegiance to the noon,
And when the sunset fills the sky's blue cup
With claret, have these thoughts been fashioned soon
Enough? Or have the eyes of others down
Long centuries witnessed these very things,
Expressed them in my choice of verb and noun
And adjective, colored by countless springs?
How may I know my portraits done in rhymes
Have not been penned a million, million times?

Honey Hunting in Angola

By MERLIN W. ENNIS
as told to
S. F. WELTY

Illustrated by Norman Tolson

The "honey guide" or "honey bird" is unpretentious. The story that it deliberately leads men to honey is true.

THE Ovimbundu people of Portuguese West Africa, who live in the interior of Angola, have as much of a "sweet tooth" as Americans, but far less sugar, rationed or otherwise, to gratify it. Forty years ago they had no sugar at all, although they grew some sugar cane, and chewed it for its sweet taste. Now they buy unrefined sugar from a sugar factory, spending more money for it than they can easily spare from their microscopic wages. But honey was, and is, their most delectable sweet, and honey hunting is a favorite pastime.

Some of the honey comes from wild bees unknown in this country. One type is stingless, about a third the size of the Italian bees in commercial American use. These stingless bees produce good honey in fair quantity, and the natives will go long distances to find a hive. Another type of bee is very small, the size of a gnat. Native children like to go looking for it. It lives in hollow trees. Like the stingless bee it makes good honey, although in small amounts. The nectar is dark, the wax black and sticky. This wax is used for fastening feathers on arrows, and as a makeweight on drumheads to tune them.

But beekeeping is popular. The hunters of a tribe form a sort of trade union, and by common consent each man ordinarily has the exclusive right to put hives in a certain territory. One person may have from seventy-five to a hundred hives in his range.

These hives are made from hollowed-out sections of logs. They are hung up on a tree branch by means of a forked stick with a hook end. The end is fitted over a branch; the hive body is bound between the forks. In the end of the log hive is a ventilating crack, often stuffed with corncobs, except for a hole at the bottom. The hive body is insulated against the heat by a covering of long, dry grass like American turkey-foot. If a hive were placed on the ground, it would be taken over by ants; if it were fastened to a tree trunk rather than hung in mid air, the monkeys or honey-bears would destroy it.

The bees that the Ovimbundu hive are Cyprian in type, much like the Italian bees used in America as to size, but with shorter tongues and shorter tempers. Cyprians have the reputation, in every country where they have been tried, of being extremely cross and difficult to handle. But Ovimbundu beekeepers work without benefit of veil or gloves; a man without courage to do that simply does not keep bees.

I have heard stories of these bees stinging men to death, but I have never known of an actual case, although I have known men to be very badly stung. An American missionary had a harrowing experience

with these Cyprians. He was in Benguela, walking peacefully down the main street, which was then only a dirt road. A swarm of the bees flew by and stopped to cluster on his head and body. Natives gathered around, but at a discreet distance, for they were too terrified to do anything. Being a man with presence of mind, the missionary sat down in the middle of the street, which was fortunately very dusty. Slowly and gently he gathered up handfuls of the dust and threw it up and over and around his head at the bees. They continued to buzz around him for many long minutes, but the dust finally drove them away, leaving him unharmed, and, no doubt, immeasurably relieved.

When I went from our mission station at the foot of Mt. Elende farther into the interior to stake out the concession where our Central Institute was later built, at Dondi, the trip was memorable for the intimate acquaintance it provided with that member of the cuckoo family which ornithologists call *Indicator major*. Commonly we call it the "honey guide," Boers, the "honey bird," and the natives by a name that gives no clue to the activity that makes it famous. It is unpretentious to look at, brown above, darker on the wings and tail, and grayish-white on the under surface of the body. The story that it deliberately leads men to honey, in order to get itself a meal of otherwise unobtainable sweets, or grubs, sounds like a tall tale, but has been well authenticated as fact and not fiction. African hunters know the honey bird well.

Many bees hive in abandoned termite nests, entering them through a "chimney" at the top.

We were following the watershed between the Atlantic and Indian oceans. It was country about as gently rolling as southern Wisconsin, and somewhat the same type—plains with scrubby brush, little stream valleys with woodland growth. The streams run one way into Keve and the Atlantic, the other way into Kuvangu and the Zambezi—whose original name, Sambesi, means "father of fish." Along this watershed winds the old Boer transport route.

Ordinarily, in the country of the Ovimbundu, there would have been beehives all along our way. But the natives had discovered that there was no use putting them out. Among themselves it was a crime to rob another man's hives, and, whatever the taboo was, it worked. But, along the transport route, men of other tribes, employed by whites, robbed the hives of their honey, destroyed them, or threw them uselessly to the ground. The beekeepers, for five miles on either side of the route, had given up struggling against these depredations. All the bees in that neighborhood, whether they had ever been domesticated or not, had gone back to the wild. Nevertheless, I happened to notice a bee colony along our way.

It was in the ground, in an old white ant hill that the ants had abandoned and the bees had taken over. An "ant hill" sounds as if the bees had a mound-like dwelling. Actually they went in and out through the "chimney," which the ants had built above ground for ventilation, but all their community life was carried on in an underground chamber.

I had a party of six "carriers." They were really porters, for they did not carry me, but had charge of my camping and surveying equipment. Five were Ovimbundus; the sixth, a man about thirty-five, came from a different tribe. His people lived farther inland. Years before, when slavery, although illegal, was still practiced, he had been stolen from them and sold among the Ovimbundu. He had the "filed" teeth, which are said to denote the practice of cannibalism in a tribe, although to call the teeth "filed" is a euphemism. The filing is done with a small axe. This is equipped with a blade turned like an adze. The person to be operated on lies on the ground on his back, the operator sits on him and chips clefts between all his upper teeth! But, cannibal or not, this porter was an expert beeman.

He wore only a dirty cloth, secured by the string around his waist on which it was hung. This cloth ordinarily falls loosely around the knees, but, in order to work among the bees, he pulled one corner between his legs in each direction, and fastened it up tight in his string, so that he was girded with a tight breechclout. This left a maximum of his body exposed to possible stinging, but he took no further precautions. With bees buzzing all around him, crawling over his head, neck, arms and torso, even into his woolly hair, he proceeded to take out of the ant hill twenty pounds of delicious honey without being stung at all. The carriers and I all shared in the feast, only somewhat differently. I took my honey straight; the other men ate brood comb, grubs and all. They say the grubs add zest to the taste!

Eating sweets always seems to awaken an appetite for more, and we all began a sharp watch for a new source of honey. The men started talking about the honey guide, and wishing one would appear. An hour had hardly passed before a porter shouted triumph-

antly; he heard a honey guide chattering somewhere.

It was sitting on a branch of a usia tree. "U" stands for "tree," "sia" means "leave," and the name comes from the fact that this kind of tree is "left" standing, because of its great size, when undergrowth is cleared away. This tree was about as big as a large American elm. At the right time it would have been a find in itself, for it was of a variety that bears large, plum-like fruits. These not only taste well, but have seeds about the size of a black walnut and good to eat. But it was not the fruiting season, so the interest of the men was concentrated on the bird, which they all recognized.

Only hunters ever deal with the honey guide. This is a matter of common sense, since it may lead them to a live lion, or a dead snake, although it usually lives up to its name. The Ovimbundu are as well satisfied if it guides them to meat as to honey. They do not follow it unless they are prepared to hunt a live animal, and, if the prey turns out to be dead, a little detail like the odor of decay does not destroy their appetites. The men insisted that we should take time off from our business to see what the bird would lead us to, and I gave in. I was carrying a rifle, and it was not ordinarily lion country, so there was not likely to be danger.

Natives make a rude hive for the wild bees, and hang it from the branch of a tree in this manner.

Our beeman whistled at the bird, and, after a short duet back and forth, the bird flew off. It perched on another branch and chattered away until our party came up and the leader whistled at it again. Once more it flew, lighted, cried its "Cherr, cherr," waited for us to catch up and whistle, and then led us on. After three stages in this game, the bird once more perched on a branch, but this time remained silent. "Somewhere near are the bees," said our leader. Sure enough, quite close was another abandoned white ant hill taken over by a bee colony. The beeman robbed it of its treasure, left a reward of honeycomb for the bird, and we resumed our way well sweetened.

In the days that followed, while we were staking out our concession, we had several more meetings with honeybirds. The interior of the country was so sparsely populated that great parts of it were not settled at all, and the government licensed individuals and institutions to stake out claims to unoccupied and unused land under certain conditions. Our mission had received a "concession" of a designated size in this territory, and it was my business to stake it out with wooden posts marked with the government's concession number. This work naturally took our party over a considerable area. Following honey guides that we saw in the course of our work, we found seven bee colonies. Five were in ant hills, easily robbed, but the other two happened to be in hollow trees. This did not deter our beeman. He would gird himself, take his axe in hand and climb the tree, chop out a side of the trunk, and hand the honey down. He was never once stung by any of the bees that lit on him.

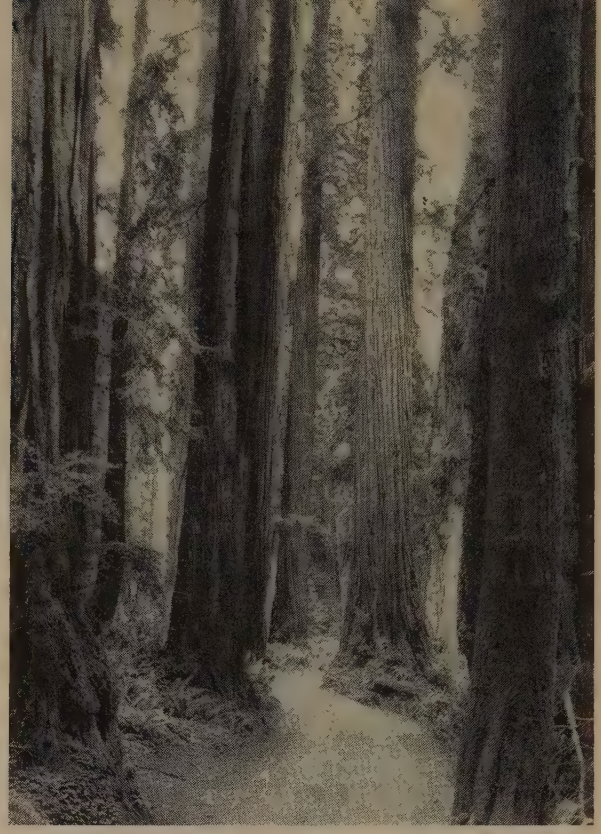
But the eighth, and last, opportunity we had to follow a honey guide, we hunted high and low for hive or honey. "He lied," said our beeman disgustedly.

★

Gift of Honey

By RUBY ALTIZER ROBERTS

Today it came. The postman's casual hand
Transferred the fragrant package to my own,
A sudden bit of Smoky Mountain fanned
Its breath across the miles. I heard the drone
Of armored bees invading purple mist,
Of rhododendron clustered by a stream,
Where clouds of honeysuckle, lately kissed
To sweet submission, lay in velvet dream.
I wondered when I lit my humble bread
With wildflower gold, how I could bear to see
Guilty reminder that I must be fed
By unrequited labor of a bee:
And knew that with each shining thread that drips
I'd feel the wings of beauty brush my lips.



At the Feet of Giants

By LESTER ROWNTREE

In an article on the coast redwoods, published some years ago in one of America's foremost magazines, it was asserted that these trees were "as barren of undergrowth as a well worn campground." If the ground beneath the redwoods was bare, it was bare because man had made it so. In its natural state *Sequoia sempervirens* is accompanied by a unique and superlatively beautiful community of small plants, among which are some of the West's choicest wild flowers. To know the redwoods, and their plant complements, one should visit those places that have never been tidied up, where no undergrowth has been cut, and where no tin can or beer bottle has ever dropped and been removed.

The first time I went to the redwood region there were no beautifully-paved highways. The going was hard because of fallen logs and rocks, and a thick layer of dust covered the leaf of every fog-drenched wayside plant. When once the jungle of shrubs that edged the road was penetrated, and the dust-laden air left behind, it was possible to find fairylands where Nature was putting on grand wildflower shows. The colors of blossoms stood out against backgrounds of mosses and ferns. Above-lighting was provided by sun shafts, which turned the fog into crystal beams, brightened the many shades of green and illuminated all the foliage and blooms of the plants growing between the gigantic fluted columns of the great trees. These plants, like the redwoods themselves, were here for a reason. This was the place, of all places, where they wanted to be. Here they could enjoy the acid moisture that soaked deep into the spongy welter of redwood leaf-humus, the home of their roots. They had shelter and humidity; winter-wet and summer-warmth. Fog dripped constantly from the boughs above, and, although there was shade for most of the time, the light never fell

Old stumps in the country of the coast redwoods are often taken over by the chaste little windflower, *Anemone deltoidea*.

Among the redwood flora is splendid salal, *Gaultheria shallon*, whose flowers are followed by a black berry good for jam.

Deer-foot, or sweet-after-death, *Achlys triphylla*, smells like vanilla when its leaves are dry, hence one of its popular names.

***Smilacina*, a false solomon's seal, grows here above seedlings of barberry, thimble berry, meadow rue and other redwood plants.**

for long in any one spot. A general uniformity of likes and dislikes is entertained by all redwood ground-covers. Some species are found the entire length of the redwoods' range, from their southern boundary in Monterey County in north-central California to the few scattered groves just above the Oregon line.

Among the almost continual attendants is pretty redwood sorrel, *Oxalis oregana*, whose busy, creeping rootstocks jostle their way over tree roots and between shrubs. No place is too shady for it; none too crowded. Indeed, it is so pushing that gardeners in the redwood zone regard it as a serious pest. Throughout the redwood area there are places where wild ginger, *Asarum caudatum*, takes the whip hand, completely stealing the show. Above its fragrant, creeping roots, large heart-shaped leaves, shining like dark green leather, pile up, one upon another, to make the richest sort of a matted carpet. One must hunt on the ground beneath the foliage to find the mahogany-red flowers with their long, horn-like lobes. *Trientalis europaea* var. *latifolia*, appropriately named star flower, follows along with the redwoods. It has little tuber roots resembling the roots of eastern squirrel corn, or dutchman's breeches, and the plants occur in such masses that their leaf-whorls form a second floor—a green one—five inches above the brown, root-filled humus. From the center of each whorl, one to four pale, or deeper pink, flower-stars stand erect, each on its thread-like, three-inch stem.

All through the redwood area two prostrate creepers can usually be found making their way among taller plants, or forming almost pure stands on banks where their flat rooting stems do a fine job of holding the soil. *Viola sempervirens* is practically an ever-bloomer, and is especially fond of wayside slopes. It enjoys the open places offered by roads, and there, with its face to the light and with shade at its back, it spreads pads of small, round leaves sprinkled with light yellow flowers. *Whipplea modesta*, the other conservationist, is a low, trailing shrub of demure aspect. Its leaves are dull green, and its tiny white flowers are held in erect, numberless knobs just above the foliage. It often surrounds stalwart clumps of *Iris douglasiana*. So little grass grows beneath the redwoods, and there are so many feathery-foliaged plants, that the eye lights gratefully on the straight-sided, dark, thick leaves of this flag, finding a pleasant foliage contrast. In April and May the shining iris leaves are glorified by large but dainty flowers in cream, pale yellow, lavender-pink, blue, blue-purple, and many other shades.

In eastern and northeastern states there is an en-

dearing group of plants—members of the lily family—that bear good-looking leaves and white or creamy-yellow flowers, followed by decorative berries. Solomon's seal, false solomon's seal, disporum and wild lily-of-the-valley are some of these woodland plants. A similar group inhabits the coast redwood undergrowth, although in most cases the specific names are different. The true solomon's seal does not grow in California, but there are two of the pretenders, several disporums and a so-called lily-of-the-valley. The disporums dangle engaging bells of deep cream from bending, leafy stems suggesting huge sprays of maiden hair fern. Lower-growing lily-of-the-valley, *Maianthemum bifolium*, a plant of northern California, looks nothing like the real lily-of-the-valley. Instead of waxy bells, its flowers are tiny affairs, fuzzy with stamens. The common name has probably stemmed from the large, heart-shaped leaves having veins so deep that they look like grooves.

Redwood seedlings growing above a low groundwork of *Oxalis oregana*.

The coast sequoias also have their Saxifragaceae, although none of these are limited to the redwood groves. There is one-foot *Saxifraga mertensiana* with prettily toothed, lustrously gleaming, succulent leaves and straight stems holding white flowers. There is taller *Boykinia elata* with wide sprays of delicate bloom. Red-flowered *Tellima grandiflora* has fringe-edged cups of red, a very deep shade when darkened by age. *Mitella breweri*, called bishop's cap, has white flowers, also fringed, and an elusive fragrance that reminds one of old-fashioned pinks.

The Saxifragaceae sport many flower shapes; those on *Tiarella unifoliata's* leafy stems are star-like and alive with protruding anthers, while those on *Tolmiea menziesii*, known as youth-on-age, are slender bells hung around a straight spike. Much publicity has lately been given this species in American horticultural magazines. In eastern states it is popular as a pot plant, and, because it reproduces vegetatively, bearing little plants at the ends of its stems and on top of larger plants, it has been encumbered with the name "piggy-back-plant." Any one of these saxifrages may take over a large patch of ground, each having fixed ideas as to the amount of shade and moisture it wants. Some insist on almost steady seepage, while others, like *Heuchera*, climb dry hills, or become perchers, landing on tree stumps that they soon smother with lovely foliage.

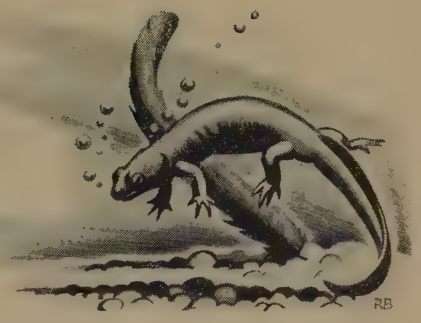
The ground beneath the redwoods is rarely quite level, and ferns mound up on rises and cover fallen trees. Magnificent stands of noble, eight-foot *Woodwardia radicans* fill openings that sunlight seldom finds, its superb fronds forming perfect background for smaller plants. Licorice fern, *Polypodium vulgare*, marches up the trunks of mossy trees, settling happily down in crevices and sitting, monkey-like, on upper branches. Bracken luxuriates. I have measured five-finger ferns twenty-seven inches across, and the common wood fern is one of the first plants to inhabit stumps and prostrate trunks.

Among the most enchanting fernlike plants is gold thread, *Coptis laciniata*, which gets its common name from its thread-like yellow roots. Gold thread insists on full shade and spreads its dark, shiny, trifoliolate leaves across pure leafmold canopied by low boughs. Vancouverias resemble garden *Epimedium*, having the same glistering quality in their thick, attractive leaves. Two species are found among the redwood flora, both having bird-bill-shaped flowers giving them the name of "inside-out flower."

I have always been enamoured of a two-inch creeper belonging to the pea family. It is a variety of *Vicia americana*. Its foliage is sparse and not particularly impressive, but the bunches of flowers are as pure a shade of light blue as can be found in the flower world. Deer-foot, or sweet-after-death, *Achlys triphylla*, is another of my favorites. Each leaf is composed of three drooping leaflets standing ten inches above the ground, and the whole leaf looks something like the imprint of a mammoth deer. The stem, which seems to rise from the center of the leaf and carries the small, fragrant, white flowers, is really a naked stalk quite independent of the leaf stem. Deer-foot's other common name was given by early Californian settlers, who discovered that the dried leaves smelled like vanilla, and hung them from the kitchen beams.

Yerba buena, *Micromeria chamissonis*, has endeared itself to all redwood-goers, and most visitors, having heard of it, ask to have it pointed out. It belongs to the mint family, and is (Continued on page 218)

Keeping Efts and Newts



By ELMER EUGENE BARKER

Illustrated by Robert Barker

It is a refreshing experience for a Nature lover to walk through the woods on a day when the sun shines out after a night or several days of rain. Besides the freshness of everything and the delightful smell of warm, moist earth, one then sees Nature's colors in their most vivid hues. Fresh are the lichens and fungi that have waited in dried-out, inconspicuous obscurity for this moment. Mosses that were crisped and curled have expanded into lovely forms of exquisite daintiness; tree trunks and rocks glow as though freshly-painted. All Nature is revived into new life.

The climax of such a walk may well be a glimpse of one little forest creature, rarely seen at other times because it usually remains in hiding during the daytime, and ventures forth only when the air is humid and the vegetation is damp. This is the red evet or eft, *Triturus viridescens*, a little salamander whose sensitive skin must not be exposed to the dry, hot air that lizards love. Eyes of jet and gold shine in the eft's flat head, and vermilion spots glow in rows along the sides of his flesh-colored, orange body. Its orange-yellow belly is peppered with sepia or black dots. To one so fortunate as to see this fellow it appears like a jewel in the midst of the greenery of mosses and ferns.

This little denizen of the upland forests leads a double life not known to many persons who encounter it in either phase of its dual existence. His alias is the aquatic newt that is a familiar inhabitant of quiet, fresh-water pools and ponds in the northern states. The newt lays her eggs, which are about the size of small peas, attached to submerged plants in the water. Like eggs of other salamanders, these are protected by a tough, transparent, jelly-like envelope. The newly-hatched youngster is a larval form shaped like a tadpole. It breathes for a time by means of external gills placed just back of the head. At a later stage, after legs develop, it comes out of the water and breathes with lungs. It seeks higher land and thereafter its life is entirely terrestrial. Indeed this is now the eft of the upland forest.

This existence, it is said, lasts about two years and a half. After reaching maturity the eft feels a yearning for the waters that welcomed its ancestral clan. It finds a quiet pool and sinks into its water, never to return voluntarily to the forest of trees, mosses, ferns, rotten logs and humus. The color changes from orange-vermilion to olive-green, although the bright spots remain as unchanging as the leopard's. Even the salamander's form undergoes a water change. As it grows in size its rounded tail develops finlike edges above and below. These are prettily waved at the edges and help in swimming. The creature's appetite now becomes voracious, and, I am sorry to relate, its manners become shockingly degenerate and depraved. No longer satisfied to eat dainty little insects, juicy and green, it seizes and swallows almost anything that it can capture. In captivity the newt will take bits of fresh liver and small pieces of fresh meat.

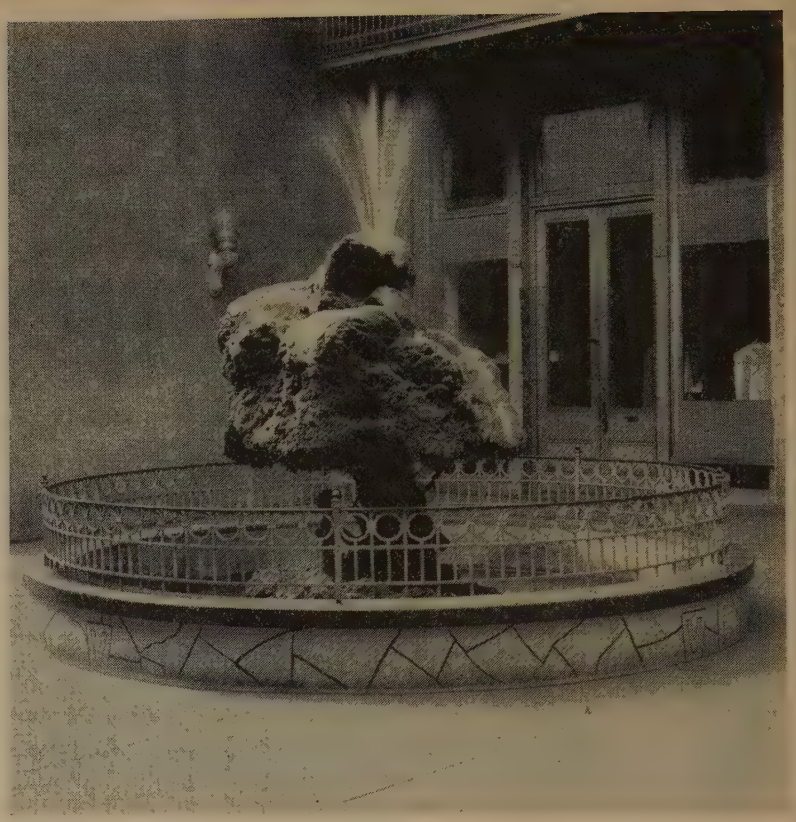
I have kept newts in a fresh-water aquarium where they were interesting to watch, although rather stupid creatures. Do not put one or more newts into your aquarium unless you can become reconciled to losing almost all the other animals in it. The newt's appetite will require the sacrifice of all snails and small tadpoles and, so far as the newt can manage it, whatever small fishes also have the misfortune to occupy the same aquarium.

Like snakes, salamanders shed their skins from time to time. It is interesting to watch a newt shedding its skin. At first a break occurs along the top of the head, then a split opens down the neck. After a while, with violent contortions the arms are extracted one by one from the skin, like a boy getting out of a tight sweater. Then follow more squirming and struggling until most of the body has been freed and only the tail remains bound. Meantime, the salamander has grasped the old skin and swallowed it little by little. With this leverage, and by dint of twisting and squirming, it frees the tipmost part of the tail. The last of the skin is swallowed with mighty gulps. What an excellent example of frugal salvage—one not learned by wartime economics but practiced in the newt's ordinary living!

Newts are not content to remain long periods of time in a small aquarium. Unseen, they crawl up and over its sides and disappear, unless confined by a glass top or netting. At a (Continued on page 218)

A Moss Fountain

By HENRY S. CONARD



PHOTOGRAPH FROM ARCADE FOTO SHOP

The interesting moss fountain in the Arcade at Springfield, Ohio. The moss completely covers the mass of calcareous tufa upon which the fountain continuously plays.

While waiting for a train in Springfield, Ohio, on my return from the 1944 field trip of the Sullivant Moss Society, I wandered into the Arcade. Like other "arcades" this is a broad passage through the middle of a city block, roofed with glass, and lined on both sides with small but busy shops. Strangely fitting my mood, I found there, a little to one side of the main thoroughfare, a fountain carrying on its upper basin a ton, more or less, of calcareous tufa, softly green with a carpet of tiny, recurved moss leaves. The mass grows by accretion from the spray of city water, conditioned by the moss, which constantly keeps its tips exposed. From time to time big chunks of tufa break off and fall into the lower basin. The broken surface soon heals over with a growth of moss.

Thanks to Mr. R. C. Patrick, engineer of the Arcade Building for more than thirty-five years, I was able to gather information about the fountain and the moss. And thanks to the photographer who operates one of the shops, I have a photograph, taken at about the time of my visit.

The moss was never purposely planted there. It just came, about twenty-five years ago. One guess is as good as another whether it started from spores or gemmules carried as dust, or in the city water. The water carries twenty-two grains of hardness, as such things are commonly expressed. The spray of the fountain flows twenty-four hours a day, every day in the year, fed by a three-eighths-inch pipe. That means about twenty-five gallons a minute, according to Mr. Patrick's figuring, which is a lot of water in a year. The cost is met by a daughter of the original owner of the property, Mrs. Edwin S. Kelly.

The temperature of the water will not change much from season to season. The temperature of the air will always be well above freezing, and never as hot in summer as outdoors. Evaporation will be almost nil, owing to the spray. Light is good, for such an enclosure. Direct sunshine strikes the fountain, through the skylights, for a short time in mid-morning.

A specimen of the moss kindly sent by Mr. Patrick proves to be *Gymnostomum recurvirostrum.* We found the moss on our field trip twenty miles from Springfield, in John Bryan State Park, near Yellow Springs, where Antioch College is located. It grows in sods and lumps one or two inches deep, crisp with lime deposits. A few capsules were secured. At the fountain no capsules have been seen. This moss is at home on vertical or overhanging rock-faces, moistened with seeping water or spray from a waterfall, in perpetual shade from direct sunlight, but preferably open to the northern sky. In deep shade of damp forested glens it is not to be expected. The rock may be limestone, dolomite or a calcareous sandstone, for this guarantees lime in the water, and is neutral to alkaline reaction. The Arcade fountain just about fills the bill.

Gymnostomum gets its name, which means "naked mouth," from the absence of teeth around the mouth of the capsule. Most mosses have a ring of teeth, 4, 8, 16, 32, or 64, each tooth linear, or narrowly wedge-shaped, or threadlike, often split or perforated. An unusual character of the moss of the fountain (the name "Fountain Moss" is preempted by the genus *Fontinalis,* whose stems string out and dangle in running water) is the permanent attachment of the lid of the capsule to the columella or rod that runs up through the center of the urn. Thus, when first ripe, the lid stands above the urn and free from it, held by the columella like an umbrella on its handle. Most mosses shed the lid alone. When this lid finally comes off it carries the columella with it. The same adherence of parts is shown by some of the black rock-mosses, *Grimmia,* and by certain of the odd alpine mosses of mountain sum- (Continued on page 220)

This is the thirty-ninth in Nature Magazine's series of educational inserts

Some Common Eastern Spring Flowers

By E. LAURENCE PALMER

Illustrated by Mary E. Eaton

FLOWERING DOGWOOD

COLUMBINE

MOUNTAIN LAUREL

MARSH MARIGOLD

GREAT LAUREL

ADDERS-TONGUE

HEPATICA

TRILLIUM

AMONG the almost universal spring urges is that of getting outdoors and away from the confines of the winter home, school or office. Getting away means a visit to the open and into the woods, and usually the trip is brightened by the discovery of some early flower. It looks so unlike the dirty snow of spring, or the oozing mud of gutters, that most of us feel like getting right down on our knees to the first flower. What happens to us then, and to the flower, depends largely on what we have been taught, or what we have learned through experience. It depends on our attitude towards life and towards society. And what we do should be, to some extent, a reasonable index of the quality of citizenship we possess. If, as a result of what happens after we get on our knees to the first spring flower, the woods or fields are no longer attractive to those who may follow us, then somehow we have been unduly selfish. This, it seems to me, is wholly out of keeping with what these flowers have to offer us.

My own personal experience with spring flowers has been varied. As a youngster, of course, I collected them to stick into paper flower baskets to give to my friends on the first day of May. Later, I remember once coming home with a basket of trout lined with flowers that added to the beauty of the fish. Still later, I became an assistant in a college botany class with an assigned duty to deliver some three hundred fresh flowers of each of three or four designated kinds three or four times a week. These flowers had to be among the species that were known intimately by other assistants in botany, whose interests were not necessarily in flowering plants, and most certainly were not in the classification of plants. The result of all this was that, to this day, a few spots where I did some of that collecting no longer boast some of the plants that I used to find there. I am justly ashamed of my contribution to this condition, even though I was acting on the orders of those who paid my salary, and who should have been in a posi-

MOCASSIN FLOWER

SPRING BEAUTY

JACK-IN-THE-PULPIT

TRAILING ARBUTUS

tion to give me more sensible advice.

Somehow or other I came to know better, and by the time I began to teach, independent of supervision, I had learned that if I destroyed any stand of flowers completely I was not doing the right thing. I well remember a remark made by my friend Professor Conard of Grinnell College, Iowa, after he went on one of my field trips. He said that it was refreshing to see a botanist who did not destroy what he professed to admire. That little remark from him gave much appreciated encouragement to a youngster who was just beginning to enjoy teaching natural history. When later I had the opportunity to go on trips with some other Iowa botanists, I appreciated why Dr. Conard made the statement.

After I had become sufficiently mature to become a naturalist instead of a botanist (ahem!), I cherished the idea of protecting species that were in danger of being exterminated, and possibly this led to my present overwhelming interest in conservation and wise use of all natural resources. I remember in my early years at Cornell, in my present capacity, seeking out places where I had reason to think botanists would not go. I based this on experience of four years as a department assistant. I found a few places that, to me at least, seemed to be virgin in nature. Great numbers of species that I had seen vanish from the usual stamping grounds grew in these little spots. I cherished them, and for years took only my most intimate friends to see them. Unfortunately, I learned to have a little too much confidence in human nature, and eventually began to take my Nature Study classes to these spots as a special favor. One spot boasted more than a hundred showy orchis flowers. I know, because I counted them on a trip with one section of my class. Two days later, when I went with another section, there was not an orchis in the area. You can imagine my reaction. It was not until a year later that I learned what had happened.

It seems that in my Nature Study class there was a student who was also studying systematic botany. He also had well developed commercial instincts, and conceived the idea of selling rare plants to other members of the class so that they might have richer herbaria. I learned that he sold my orchis flowers for a quarter apiece, but had I discovered who it was I feel reasonably certain I would have felt like tearing him into more than quarters. I never was able to get those who knew the gentleman(?) to tell me who he was, and so I never was able to let him know what I thought of him. It is barely possible that he may by now have grown to maturity and may be one of the many thousands of readers of *Nature Magazine* to whose attention this insert may come. If so, it will have served at least one good purpose.

But a vengeful spirit cannot or should not remain long with us when we think of spring flowers. Rather, we should think of what they have to contribute to human happiness and to the general economies of Nature. In the insert's tabular section we have given information dealing with the role some of these plants play as medicines, as poisons, as vegetative cover, and so on. We have touched on the assumed qualities they had to people who thought that because the leaf of an hepatica slightly resembled a liver that this was a sign that some extract of that plant contained something for stimulating a "torpid liver." We have dealt with the food value as well as with the purported poisonous properties of those beautiful yellow splashes that appear in the marshes when the cowslips come into bloom. We have even suggested something of the intricate interrelationships involved in the part insects play in effecting pollination and in the production of fertile seeds. We have carried this to such an extent that we have suggested the further inter-relationship in the picture that develops when honey bees gather nectar from the glorious blooms of rhododendron only to produce, because of this relationship, a honey that is reported to be poisonous to man.

There are some features that we have not considered in this insert; features that we would like to include but cannot, simply because we do not know the answers. For example we know firms that advertise that they have wild flowers for sale to those who wish to establish wild flower gardens. We have reason to believe, from what we know of some of these firms, that they depend largely on wild-grown plants for their source of supply. The Wild Flower Preservation Society of Washington, D. C., has published some things on the culture of the commoner species of wild flowers, and the New York Botanical Garden also has published some notes in this field, but there is not widely

available enough of this information to serve adequately for the protection of useful species. We now have abundant directions on how and when and where to plant corn and radishes and how to harvest them, but we have comparatively little corresponding information on our wild species. If a gardener could go to a florist shop, or the grocery store, and there purchase for a few cents a packet of seeds, let us say, of fringed gentian, or of some other species, and find printed plainly just what he should do to get plants from those seeds, it would make quite a step in wild flower preservation. I happen to know that it is not so simple to raise adders-tongues or fringed gentian from seeds as it is to raise radishes or corn.

It may be that these wild species are not of sufficient economic importance to foster studies of their habits, but that should be no deterrent. A few years ago we did not know how to raise some of the valuable orchids that are now for sale at the florists' shops. We were told that it took years for the seeds to germinate, and this fact made it almost impossible to produce new forms by the cross-pollination techniques so commonly employed by the plant breeder. A plant physiologist friend of mine learned how to shorten the germination period tremendously, with the result that orchids now can be produced economically under artificial conditions, and there is no longer such a drain on the wild forms. So highly competitive was the demand for some orchids in the old days that one firm, which had located the natural habitat of an unusually beautiful form, not only employed searchers to collect all the plants they could for commercial use, but urged the destruction of plants that could not be collected. This was done for fear that these surplus plants might fall into the hands of business competitors and ruin the market of those on which the firm in question apparently had a "corner." With the mastery of the techniques for raising orchids quickly and economically, the bottom naturally dropped out of any corner this unscrupulous firm might have established.

Within a little more than a year new techniques have been developed for shortening the germination period of irises, with the result that now new crosses can be produced in a much shorter time than formerly was the case. This is just so much to the good, and the result, of course, will be the stimulation of interest in the production of new forms and a wider opportunity for people to enjoy these new plants.

But when it comes to getting comparable studies for species that do not have such economic importance, we have made little progress. While an orchid plant of great rarity may be worth hundreds of dollars, you can buy cheaply from any wild flower supply firm all the spring beauties, trilliums and adders-tongues you wish. We know that in the wild state it takes seven or more years for the adders-tongue plant to develop from seed to seed. No one wishes to wait that long for a plant of that sort to produce results in a wild flower garden when he can go into someone's woods and dig up all he can use between now and tomorrow afternoon.

The fact that we do *not* know how to make these plants do what we wish them to do should be a challenge to many. It might well challenge the interests not only of young folks who will live long enough to follow through a number of normal generations of wild plants, but it might well enlist the support of older persons, who for any one of many reasons find time on their hands and little to do. It may be that these persons are not in a position to solve the problems of shortening the germination period of a common wild flower, but they should be in a position to find what the facts may be about the seed to seed cycle of an enormous number of wild species about which we know little or nothing.

DUTCHMAN'S BREECHES

PINK AZALEA

BITTER BUTTERCUP

WILD YELLOW LILY

Some three years ago I wrote an insert in this series dealing with fall garden flowers. I ended it with the statement that I had some interesting mallows in my garden that I should like to exchange with my readers for the seeds of plants in their gardens. I got responses from coast to coast, and from Texas to Canada. Only yesterday I got a letter from a lady a thousand miles away from my home, saying that this year she had the first bloom from the plants that developed from the seeds I sent her three years ago. Some other friends wrote last year of blooms they had gotten from seeds sent at the same time. I wonder what would have happened if I had sent seeds that would not have produced flowers for seven years instead of for three years. Would my friends have had sufficient patience?

COMMON NAME SCIENTIFIC NAME	JACK-IN-THE-PULPIT INDIAN TURNIP *Arisaema triphyllum*	LARGE-FLOWERED TRILLIUM *Trillium grandiflorum*	WILD YELLOW LILY *Lilium canadense*	YELLOW ADDERS-TONGUE *Erythronium americanum*
GENERAL DESCRIPTION	Height: to 3 feet. Leaves: 1 or 2, each of three parts, almost like leaflets, with netted veins, and unbroken margins, each part, to 7 inches long and 3.5 inches wide. Leaves: arise from a deeply buried, turnip-shaped, solid, bulb-like stem base. Roots: spring from the base of this structure.	Height: to 18 inches. Stem: stout, erect, arising from a deeply-buried, irregular bulb, easily broken, and bearing at the top a whorl of 3 leaves, each to 6 inches or more long, and nearly half as wide, with rather prominent branching veins. Stem and leaves: smooth, and dark green.	Height: to 5 feet. Stem: slender, smooth, light green, with leaves in whorls of 4 to 10, there being 4 to 8 whorls, leaves being to 4 inches long and to ¾ inch wide. Usually, no leaves on lower part of stem. Bulbs: borne an inch or so apart, on a stout rhizome, each to 1½ inches in diameter.	Height: to about 10 inches. Leaves: arise from deeply - buried bulb. Young plants bear one leaf; mature plants, two. Leaves: to a foot long, green, or green with purplish - brown markings, pointed at each end, with unbroken margins, smooth, usually curving towards upper surface.
RELATIONSHIP AND RANGE	Order Arales. Family Araceae. In rich, moist woods, and thickets, from Nova Scotia through Ontario to Minnesota, south to Florida and Louisiana; up to altitudes of 5000 feet in North Carolina. Often, found in crevices of rich earth on the sides of shaded gorges. Closely related to Green Dragon, *A. dracontium,* which ranges farther to the south and southwest.	Order Liliales. Family Liliaceae. From Quebec to Minnesota, south to North Carolina and Missouri and found at elevations up to 5000 feet in Virginia. Favors rich, moist woodlands, with a deep, loose soil, and will not long survive the sun coming with the destruction of the woods. It will grow in the shade by houses.	Order Liliales. Family Liliaceae. Meadows and open woodlands, from New Brunswick to Ontario and Minnesota, south to Missouri, Georgia and Alabama. There are probably less than a hundred species of genus *Lilium,* but most of them are beautiful graceful flowers, too attractive for their own good in the wild. Common also in bogs.	Order Liliales. Family Liliaceae. New Brunswick, to Florida, west to Arkansas, and Minnesota, with close relatives extending the range; one found on the West Coast. It favors moist woodlands, near streams, and may persist for some years in the open after forests have been cut. Some species prefer open country to woodlands.
REPRODUCTION	Usually, the flowers in a given cluster are either staminate or pistillate. Flowers on the spadix or "jack" in the "pulpit" (spathe). Spathe is hooded and marked with green or purple or brown. Fruit; a scarlet berry containing a few seeds, the fruit being exposed when mature. Perennial.	Flowers: erect or nodding, composed of 3 green sepals, each to 2 inches long, and 3 petals each to 3 or more inches long, that are white at first, but change to blue or pinkish with maturity. Stamens have anthers about ½ inch long. Fruit: a berry an inch long, red or black.	Flowers: nodding on ends of stems arising from the uppermost whorls of leaves. From 1 to 10 flowers per plant, each to 3 inches long or wide, bright orange yellow, with purple-brown spots, with red anthers on stamens. Pollination: mostly by honey bee, and leaf-cutter bee. Perennial.	Flowers produced the seventh year after the seed has been shed; the first two years, little showing, and, the intervening years, the leaves per plant being but one. Many offshoots are formed from the bulb and help in multiplying the plant. Flowers: yellow, nodding, with segments to 1½ inches long.
INTERRELATIONSHIPS	Pollination: effected by beetles and small flies that visit the "hood", the flies commonly being of the family Mycetophilidae. Seeds may be carried by animals, or merely drop to the ground. The fruit, or "turnip", eaten or bitten raw, causes a severe stinging pain in the mouth for some time. Flowers: April to June.	One of the most beautiful of woodland flowers of late spring. Has many equally attractive relatives but none have pleasant odors. The wake-robin or red trillium, *T. erectum,* has a flower with a most offensive odor. The painted trillium, *T. undulatum,* with red and white flowers, is popular with wild garden enthusiasts.	Probably the commonest of the wild lilies growing within its range, and, because of its beautiful, nodding flowers, it is always popular. Related turk's-cap lily has the lower leaves whorled, but the others crowded along the stem, and it has the outer flower parts bent farther back.	*E. dens-canis,* the dog's tooth violet, of Europe, as well as the native species, may be planted in wild gardens and in rock gardens. It is smaller than this species. Pollination: by bees such as queen bumble-bees, by cabbage butterflies, sulphur butterflies and by some flies of the early season.
ECONOMIC IMPORTANCE	Fresh "turnip" reported to have some medicinal properties as an emetic, and a mixture made of this and of the fruit is used in mixtures to kill insects. Turnip, boiled or baked, then peeled, dried, pounded to flour, heated again, and allowed to stand becomes mild and edible and was an Indian food. Do not eat raw.	Leaves: considered to be edible by some outdoorsmen but the plant is too attractive to be destroyed for food. It makes a hopeless bouquet because of its lack of fragrance and because it wilts quickly. There is no excuse for collecting it for bouquets and thus ruining a beautiful woodland.	The fleshy bulbs of these lilies were used by the Indians to thicken soups and were eaten cooked. However, anyone destroying these beautiful flowers merely for the sake of eating them might find himself wished into the stew pot of any group of rabid wild-flower lovers.	Bulbs: edible, either raw or boiled. Beauty of the flowers is such that the bulbs should be eaten only in an emergency when other food is not available. If the flowers must be picked, avoid picking the leaves, since loss of leaves and flower in a single year may destroy a plant that took 7 or more years to mature.

MOCASSIN FLOWER PINK LADY SLIPPER *Cypripedium acaule*	PUSSY WILLOW *Salix discolor*	BITTER BUTTERCUP *Ranunculus acris*	MARSH MARIGOLD COWSLIP *Caltha palustris*	COLUMBINE HONEY-SUCKLE *Aquilegia canadensis*
Leaves: 2, lie almost flat on the ground, to 8 inches long, and to 3 inches wide, dark green, with conspicuous, parallel veins. Roots: fleshy, fibrous, and much branched. Flower-bearing stem: may reach a height of 15 inches, and may bear a small, leaf-like bract on it.	Shrub or small tree: height, to 25 feet; trunk diameter, to 8 inches. Trunk: usually short, and with many ascending branches that form a round crown. Twigs: at first, hairy; then, smooth and stout; flexible, red-purple to dark green. Leaves: alternate, smooth, bright green above, smooth and gray beneath when mature, to about 5 inches long.	Height: to 3 feet. Erect, branching particularly in the upper areas. Upper leaves: without stems, or with but short ones, three-parted. Lower leaves: on long stalks, with blades deeply cut or divided into from 3 to 7 parts radiating from a common point. Stems: hollow, hairy and branched. Roots: clustered and fibrous. Plant bitter.	Height: to 2 feet. Stem: erect, smooth, hollow, branched above, rich dark green. Leaves: long-stemmed, kidney-shaped to broadly heart-shaped, from 2 to 8 inches broad, smooth, bright dark green, with conspicuous veins, lower leaves longer-stemmed than the upper. Underground root system: soft and spongy, with fine rootlets.	Height: to 2 feet or more. Open branching habit, usually smooth. Leaves: 2 to 3 times compound, 4 to 8 inches broad, those at the end being without stalks. Lower leaves: on long stems. Lower side of leaflets, paler than the upper surfaces. Root system: long, coarse and tough.
Order Orchidales. Family Orchidaceae. From Newfoundland to Manitoba, and Minnesota south to North Carolina, and Tennessee. In Virginia, ranges to altitudes of 4500 feet. It bears a number of common names such as Noah's Ark, Squirrel's Shoes, Camel's Foot, Nerve Root, Old Goose, Indian Moccasin and Two Lips.	Order Salicales. Family Salicaeae. From Nova Scotia to Manitoba, south to Delaware and Missouri, being most common at edges of marshlands, along streams, sometimes on moist hillsides, but will grow in dry regions if transplanted when well developed. Usually grows mixed with other willows and shrubs rather than as a pure stand.	Order Ranales. Family Ranunculales. Found in fields and roadsides, particularly where there is abundant moisture. Generally very common. Ranges from Newfoundland to British Columbia and southward to Virginia and Missouri, also in Bermuda. Naturalized from Europe and possibly introduced by seed as it occurs as a seed impurity.	Order Ranales. Family Ranunculaceae. Found in marshes and other wet spots. Frequently forming spectacular displays. Ranges from Newfoundland to Saskatchewan and south to South Carolina and Nebraska, with two other American species found in much the same area; one more or less aquatic. Native of North America.	Order Ranales. Family Ranunculaceae. Common in rich woodlands and in the loose soil in gorges and on wet cliffs. Sometimes rather abundant even in fields. Ranges from Nova Scotia to the Northwest Territory area and south to Texas and Florida and in the Rocky Mountains. Found at 5000 foot elevation in Virginia.
Flower: borne singly at the top of a tall stalk or scape. It is conspicuous largely because of its inflated lip, which is 2 inches or more long, pink or sometimes white, and marked usually with dark lines. Sepals: greenish purple, spreading, to 2 inches long, with the lateral ones united.	Flowers: appear in March, or earlier, on twigs of previous season's growth, before the leaves appear. Staminate and pistillate catkins: on separate plants, the catkins being densely flowered, and with brown-tipped bracts. They develop from the well-known "pussies." There are long, shining hairs on the flower scales. Fruits: fuzzy capsules.	Flowers: yellow, to 1½ about 1 inch broad, shallow, and with the 5 yellow petals, two or three times the length of the sepals and many times broader, borne on long, slender stems. Stamens: very numerous. Pistil: many to a flower, one-seeded, compressed and short beaked. Flowers from May through October. Insect pollinated.	Flowers: yellow, to1½ inches broad, shaped like a shallow cup, bright yellow, blooming in May and June. Petals: none, the sepals being petal-like and dropping off relatively early. Stamens: numerous. Pistils: 3 to 12 or more, splitting down one side, to 1 inch long, freeing many seeds. Perennial. Pollinated by syrphid flies and bees.	Flowers: scarlet and yellow, nodding, 1 to 2 inches long, with 5 nearly straight spurs, each to ¾ inch long and tipped with nectar gland. Sepals: 5, drop off early. Stamens: numerous, often with tips turned back. Pistils: 5, each splitting down the side to free many seeds. Flowers: April through June, pollinated by moths and butterflies.
Favors sandy or gravelly woodlands, usually where the soil is thin and likely to be slightly acid. The leaves may be found through most of the year with the flower or fruit body on the scape that rises between them. The flowers appear in May and June.	Twigs may be cut in winter and forced to form "pussies" indoors, and since these have a commercial value with florists, the plant has some value other than as a soil anchor or as an ornamental. It may be easily reproduced by rooting slips in water and transplanting these to suitable ground. Wood: weighs about 28 pounds per cubic foot; soft and weak.	Green parts contain a volatile poisonous substance that vanishes when the plant dries into hay. Poison affects horses, sheep but most particularly cattle, causing inflation of intestinal membranes and producing bitter and sometimes reddish milk from dairy cattle. Because of bitter taste plants not normally eaten if better forage is available.	Green parts contain the poisonous alkaloid jervine and the glucoside helleborin both of which are destroyed by drying or cooking the plant. Sheep, cattle and horses may be poisoned by eating the green tips. Name means "cup of marsh." Other common names include "capers," "soldiers-buttons," "boots," "meadow boots," "drunkards," "crazy-bet."	Has many common names such as "rick lily," "jack-in-trousers," "bells," "meeting house," "clucky" and "honey suckle." It is of course not at all related to the woody plant known as honeysuckle. There are a number of related garden species, some of them with blue flowers and usually with larger flowers.
This is the state flower of Minnesota, and in New York State and some other states it is illegal to pick the flower on State-owned lands, or to transplant or injure the plant at any time when it is growing on such lands.	Commercial value lies in its attractiveness as an ornamental, and in the sale value of the early spring flower buds for indoor decoration. Frequently, grotesque grafts are made to produce unique ornamental trees used in landscaping. This plant provides the commonest perch for popular pictures of birds singing in the early spring.	Since cattle avoid this plant, it survives to produce seeds unless these are cut or otherwise destroyed. The plant will not survive cultivation or drainage, so control is by cultivation, cutting, draining or encouraging rivals by good fertilization. The hay is not dangerous, since the poison vanishes with the drying.	While the green plants eaten by cattle may cause stoppage of milk, diarrhoea and stomach inflation, the cooked greens are a standard spring "green," and are delicious. Buds are picked, parboiled in salt solution and pickled as "capers." In preparing greens it is suggested that the first water be poured off and not used.	The state flower of Colorado is the blue columbine. The flowers are so beautiful and wilt so quickly that there is no reason why the plants should be collected for bouquets. Usually the plants are badly torn by ruthless collectors. Interesting to watch the way pollination is effected.

COMMON NAME SCIENTIFIC NAME	HEPATICA LIVER-LEAF *Hepatica americana*	DUTCHMAN'S BREECHES *Dicentra cucullaria*	CAROLINA SPRING BEAUTY *Claytonia caroliniana*	COMMON VIOLET *Viola cucullata*
GENERAL DESCRIPTION	Height: to about 6 inches. Rather heavily hairy, with leaves and flower-stems arising from a common point close to the ground. Leaves: on long petioles, with 3 blunt lobes, to 2½ inches broad, when mature resting on the ground, may be green under winter's snows. Roots: fibrous and profusely branching.	Height: to 10 inches. Leaves and flower stalks arise from a common point close to the ground. Plant, delicate, immaculately smooth and pale gray-green. Leaves: slender stalked, with finely-divided parts that may be almost linear. Underground parts: bulbous but not like the yellow tubers of squirrel corn.	Height: rarely to 1 foot, and less likely to sprawl than is the Virginia spring beauty. Basal leaves: to 3 inches long, ¾ inch wide, being conspicuously proportionately wider than in the Virginia species. Upper leaves: borne on petioles to ½ inch long. Root: broad, deeply-buried, with smaller roots coming from many places.	Stemless, the leaves and flowers arising from rootstocks at or just under the surface of the ground. Smooth. Leaves: broadly heart-shaped, sometimes to 3½ inches broad, with long petioles, but the leaves usually slightly exceeded in length by the flowers. Rootstock: substantial but relatively short and with relatively fine contributory roots.
RELATIONSHIP AND RANGE	Order Ranales. Family Ranunculaceae. Common within range, on dry or open wooded banks, in gravelly soil that may be acid or neutral unlike the related *H. acutiloba* that favors lime soils. Ranges from Nova Scotia to Manitoba and south to Missouri and northern Florida and in Alaska. To 2600 foot elevation in Virginia.	Order Papaverales. Family Fumariaceae. Often very common, in rich woodlands where there is deep leaf mold, but mostly over lime soils, surviving on more sterile soils than squirrel corn or growing with it. Ranges from Nova Scotia to Minnesota and south to Missouri, Kansas and North Carolina. In Virginia, to elevation of 4500 feet.	Order Caryophyllales. Family Portulacaceae. In damp woods, from Nova Scotia to Saskatchewan, south to Connecticut, in highlands to North Carolina, and in west to Ohio and Missouri. In Virginia, found up to 5000 foot elevation, but is rare near seacoast. The related *C. lanceolata,* with shorter leaves, is found from the Rocky Mountains to the Pacific coast.	Order Violales. Family Violaceae. Often very common in wet places commonly in the shade in bogs or woodlands where the soil is either sour or limy, though usually less abundant on the latter. Ranges from Newfoundland and Quebec to Ontario and south to the mountains of Georgia being most common in the granitic Northeast and on the Coastal Plain.
REPRODUCTION	Flowers: blue, purple or white, saucer shaped, to 1 inch broad, flowering from December through May in some seasons. Petals absent, being replaced by to 15 colored sepals, with green involucre acting like calyx. Stamens: numerous as are the separate, 1-seeded, hairy, pointed fruits. Pollination: by bees and flies.	Flowers: white, nodding on ends of drooping stalks, with two spreading, trouser-leg-like spurs usually with point of spurs uppermost. Flowers in April and May about a week before squirrel corn. Sepals: 2, scalelike. Petals: make the "breeches." Stamens: 6, in 2 sets opposite outer petals. One pistil. Seeds: 10 to 20. Pollinated by bumblebees.	Flowers: similar to those of the Virginia spring beauty but usually fewer and likely to be smaller. Flowering period is from March through May, and the flowers open only when they are exposed to sunlight. They close relatively quickly if plant is plucked. Pollination: by insects seeking nectar and pollen.	Flowers and their stems: slightly longer than the leaves. Flowers: violet and darker in the throat though sometimes white. The lateral petals bear beards at the throat. Stamens: 5. Pistil: one, maturing to form a fruit that bursts to free black seeds. Some flowers (cleistogamous) do not open to be pollinated; others are pollinated by bumblebees most commonly.
INTERRELATIONSHIPS	Tannin is extracted from the full-grown leaves with alcohol, and believed by some to have slight astringent value, but not normally used as medicine. In the past was believed to be of value in "stirring a torpid liver" on the assumption that since the leaves looked somewhat like the liver they could correct liver troubles.	Has common name of "little blue staggers," possibly referring to poisonous properties of leaves that include the toxic alkaloid cucullarine. More concentrated in this species than in squirrel corn. May be fatal to cattle, effects appearing to 2 days after eating and including, trembling, labored breathing, frothing, convulsion, glassy eyes and even death.	Common pollinators are the bee-like flies, Bombyliidae, the bumblebees, *Bombus vagans,* and *B. pennsylvanicum;* the bees, *Halictus* and of the family Anrenidae; the yellow butterfly, *Colias;* and the brown and black butterfly, *Papilio ajax.* Spring beauties should not be picked since one picks the leaves as well as the flowers and destroys the plant.	From April to June these violets are popular with flower pickers who normally do little damage to the plants since the picking of the flowers interferes little with general prosperity of the plants. Flowers do not wilt quickly on being plucked and revive well when placed in water. In a way, this is a buffer species protecting other flowers by its abundance.
ECONOMIC IMPORTANCE	The state flower of Missouri and of Minnesota. A most popular spring flower that survives picking rather well. Known as "three-leaf liverwort," "herb trinity," "ivy flower," "golden trefoil," "squirrel cup," "mouse-ear" and by other names indicating its popularity. It survives some transplanting to suitable gardens.	A most attractive spring flower, harmless to the touch but should not be eaten. Normally not eaten by cattle if other more suitable food is available and does not last late into the season. Pollination is by long-tongued bumblebees, the shorter tongued honey bee visitors merely eating the pollen but not reaching the nectar. Worth protecting as a wild flower.	Both spring beauties can be purchased from those who supply stock for wild gardens. A few bulbs given care for a few years may produce many. Bulbs sell for around 2 dollars a dozen when bought from the dealers.	Serves as some ground cover. Green parts are somewhat mucilaginous and it and related species have been used to thicken soup under the name "wild okra." The leaves and flowers are safe as food but the roots are somewhat emetic and should be avoided. Plants survive transplanting well, and are popular in wild gardens that will get little care.

FLOWERING DOGWOOD *Cornus florida*	GREAT LAUREL *Rhododendron maximum*	PINK AZALEA PINXTER FLOWER *Rhodendron nudiflorum*	MOUNTAIN LAUREL *Kalmia latifolia*	TRAILING ARBUTUS *Epigaea repens*
Tree or large shrub reaching a height of to 40 feet, with rough "alligator" bark that is close and relatively uniform. Leaves: opposite, dark green above and lighter beneath, smooth or finely hairy above, to 6 inches long and narrowed at base and pointed at the tip. Twigs: green and rubbery. Root system: spreading.	Height: to 40 feet. Trunk diameter: to 1 foot. Leaves: to 7 inches long and to 2½ inches wide, evergreen, tough, thick, smooth beneath, dark green on both sides, drooping in winter and somewhat curled in bitter cold weather, on stout petioles to 1 inch long, rather pointed at the end. Root system: sturdy but rather compact.	Shrub: to 6 feet high, well-branched above and with conspicuous terminal buds, from which many new smooth or stiff-haired twigs arise with the new year's growth. Leaves: more or less pointed at each end, to 4 inches long, with hairy margins and more hairy when young than when old. Root system: substantial and relatively tough.	Shrub: to 20 feet high, forming dense thickets with stiff round twigs. Sometimes grows to tree size to 40 feet high. Leaves: alternate, or sometimes a few opposite, smooth, dark green, evergreen, pointed at each end, to 5 inches long and to 1½ inches wide, with margins somewhat curved in towards the bottom side. Root system: tough, persistent.	Trailing, woody vine, to 15 feet long, slender, with hairy branches that are tough, branching and close to the ground. Leaves: alternate, thick, dark green above, coarsely veined, heart-shaped or rounded at base, darker above, mostly smooth above and somewhat hairy beneath, to 3 inches long and 1½ inches wide, on short petioles. Roots: tough.
Order Umbellales. Family Cornaceae. In woods and on hillsides usually among other woody plants, on sandy or gravelly soils, but mostly where the soil is somewhat acid. Ranges from Maine to Ontario and south to Florida, Kentucky, Minnesota and Kansas, reaching an elevation of 4400 feet in Virginia and with close relatives west to Pacific.	Order Ericales. Family Ericaceae. In woods and along streams, or sometimes in bogs, usually where there is muck, gravel or damp rocky soil, usually sour but commonly with limy soils or exposures. Ranges from Nova Scotia to Quebec and Ontario and south through Ohio and New England to Alabama and Georgia, with related species in West.	Order Ericales. Family Ericaceae. Relatively common in sour soils, open or thick woodlands, over sand or gravel or even in swamps and bogs. Ranges from Massachusetts and New Hampshire south along the mountains to Florida and Texas reaching an elevation in Virginia of 3000 feet. Relatively commonly planted as an ornamental about homes.	Order Ericales. Family Ericaceae. Common in rocky and sandy soils, sometimes forming extensive pure stands. Frequently grows where other plants could not survive. Ranges from New Brunswick to Ontario, Indiana and Kentucky, south to Florida and Louisiana, but more abundant in the middle of this range.	Order Ericales. Family Ericaceae. In pastures, rocky woods, sandy regions but most particularly in or near evergreen woodlands, often in large patches more or less completely covering the ground. Ranges from Newfoundland to Saskatchewan south to Florida, Kentucky and Wisconsin, and sometimes established in wild gardens.
Flowers: in small compact clusters in center of a cluster of four, showy, greenish, white, or pinkish bracts that are ordinarily considered to be the flowers. Flowers appear from April through June and make the plant most attractive. Fruits: appear later and through winter as scarlet structures to ½ inch long crowned by the persistent calyx.	Flowers: showy, to 2 inches broad, borne on sticky stems, white, purple or rose-colored, with yellowish, orange or whitish spots within, somewhat waxy in appearance; calyx nearly as long as the petals but hidden by them. Fruit: somewhat fuzzy capsule to ½ inch high. Flowers appear from June through July. Pollination probably by bees.	Flowers: pink or white, expanding from a short narrow tube into a showy, somewhat two-lipped, nearly 2-inch broad bloom. Blooms in April through to June. Stamens: conspicuously long and spreading, with the pistil tip curving upward. Fruit: an erect rather slender capsule to ¾ inch long, splitting to free seeds. Pollination by honey bees and moths.	Flowers: beautiful, pink or white, to ¾ inch across, in rather compact clusters at the end of twigs, erect, on densely glandular, slender stems. Stamens: about twice as many as the petals and close to them, surrounding the longer up-curving pistil and bearing web-entangled pollen that attaches itself to visiting insects, effecting pollination.	Flowers: in clusters of few to several, intensely fragrant, pink or white, to ¾ inch long and nearly as broad with the 5 petals expanding and longer than the sepals. Fruit: breaks into 5 parts that spread apart exposing a white fleshy interior. Flowers from March to May. Pollination most commonly by early flying queen bumblebees. Flowers, 3 types.
The name "cornus" refers to "horn," which, in turn, refers to the nature of the wood. Wood: brown, weighing to 50 pounds per cubic foot. Leaves in autumn often turn to a brilliant red. The fruits sometimes persist through the winter making the plant attractive through the year because of flowers, leaves, fruit and bark. Has few obnoxious insect pests.	Wood: one of the hardest and strongest, weighing about 39 pounds to the cubic foot, light brown. The green parts contain the poison andromedotoxin that may be injurious or fatal to sheep and other animals that eat the leaves when more desirable forage is not present. Honey from bees feeding on nectar is reported to be poisonous.	Plants may be transplanted in spring, not in fall and should not be placed where they will get the full glare of the sun. Soil should be well watered and sour rather than limed. Horticulturalists graft the plants freely. In winter, the young plants may be temporarily protected by a leaf mulch but mature plants should be hardy in their range.	Wood: very hard, fine, brown, weighing 44 pounds per cubic foot and used in making wooden implements that need to be carved. Green parts contain the poison andromedotoxin that most commonly is eaten by sheep causing intense salivation, and even paralysis but an animal ill for 2 days may yet recover.	Leaves are reputed to have an astringent tonic though this is not always recognized as being important. There is a related species that is found in Japan and there is a taller plant that also goes by the name of arbutus that is not the trailing arbutus. The genus name *Epigaea* means in Greek "on the earth" and refers to the trailing habit.
Commonly planted as an ornamental but not always with success. Fruits collected in September yield 4200 to a pound with good germination, may be stored by burying for two years to be planted in spring at ¼ inch depth. Has common name of "box wood," "false boxwood," "Cornelian tree," "white cornel," "nature's mistake," "Indian arrow-wood" and so on.	Rhododendron of this or related species is the state flower of West Virginia and of Washington. There are some 100 species of which this one is most popular as a landscaping plant. It transplants rather well, forms a dense year-round bank and is attractive because of leaves or flowers. The poisonous properties are not commonly brought into play.	A valuable wild and ornamental shrub protected from despoilation by law in some states and should be more thoroughly protected. The plucked flowers do not survive long and so are not satisfactory bouquet material. An edible, juicy gall may be found on twigs or leaves by end of May that is delicious or may be pickled in vinegar for later use.	Used most commonly as a Christmas decoration for city streets, great loads of it being harvested for this purpose. Used also in making wooden tools. Has been called "spoonwood," "broad-leaved kalmia," "ivy bush," "big-leaved ivy," "poison laurel," "calico bush" and "American laurel," also "spoon-hunt." A legitimate crop if harvested wisely where abundant.	The state flower of Massachusetts. It is known as "shad-flower," "gravel pink," "winter pink," "mountain pink," "May-flower," "ground laurel" and by other names. Is protected against collectors by law in some states and should not be destroyed nor should its sale be encouraged or legalized. Flowers are eaten to relieve thirst, taste spicy.

There are a few little habits that I have developed that I think have merit, and that I think may help me avoid mistakes I have made in the past so far as wild flower preservation is concerned. I see no reason why I should recommend that no one should ever pick wild flowers. Such a recommendation would not be followed and would be ridiculous. To be sure, I think I enjoy seeing a fine display of flowers in their natural setting more than I do seeing them in a vase on the piano, or pinned to the lapel of a lady who may need nothing anyway to add to her attractiveness. But people will pick flowers, and we might as well make the best of it. Possibly we can adopt the idea employed by some wildlife managers and encourage people to collect those things that are not affected seriously, even by heavy collection. Many people hunt crows on this basis, and conservation departments encourage the hunting of rabbits, in part because these animals seem to be able to survive in spite of hunters and dogs that may be bent on their destruction.

COMMON VIOLET

It should be obvious that any policy that avoids the destruction of the last of any species in a given area will, if wisely used, prevent its complete destruction. Of course, to have a species persist there must be enough individuals capable of reproduction, and with the opportunity to do so, if the creatures are to survive. So far as wild flowers are concerned I have set myself the discipline of never collecting any plants of any kind unless there are at least five good, healthy plants of that kind within a radius of five feet. I feel that if everyone followed this procedure we would not have forms vanishing from any suitable area. I also make a practice of recognizing what I call the "danger point" in any plant from which I may for any reason wish to make a specimen. This danger point is the spot below which I cannot break the plant without interfering seriously with its prosperity. I can, for example, collect many leaf specimens from a maple tree without affecting the tree in the least, particularly if I will take them from points that do not modify the shape of the tree. With a trillium, however, I must not pluck the plant at a point below the whorl of leaves because, if I do, no leaves remain to help the underground region restore the food used in developing the growth of the year. With the trillium, the point above the leaves may be broken without affecting the plant seriously. This, to me, marks the critical point, or what I call the danger point.

It seems to me that a rule such as this is more worth thinking about than trying to remember just which plants I can or cannot collect according to some list provided by the botanists. Of course, if a plant reproduces only by seeds, as an annual does, then any practice that permits the wholesale collection of the flowers and the consequent elimination of the seed crop for the year will be fatal. But, of our spring flowers, few are annuals and few depend on the year's crop of seed to survive. So as far as they are concerned the danger point idea is reasonably sensible.

Probably the best rule to follow regarding the preservation of wild flowers is that of recognizing that few such plants are destroyed by those who learn to appreciate their beauty in the natural setting. I am reasonably certain that if each reader of this article gets down on his own knees beside the first spring flower this spring, then gets up and leaves the flower there, he will be just as happy as if he had destroyed the plants. I am positive that those who follow him on a similar trip will appreciate the fact that he left a beautiful spot still beautiful. They will recognize that you possess at least one of the qualities that go with being a good citizen, and good citizenship certainly means conservation, whether for use or for beauty.

It is hoped that readers of these inserts will never be satisfied with doing no more than to identify the forms given consideration. True, there is an interesting field of science devoted solely to classification, but merely knowing the names of plants is about as satisfying as knowing nothing of persons other than their names. Identification is important to research and to botanical writing, because all sorts of confusion may arise through faulty naming.

There is comparatively little literature giving information on the plant and animal associates of the commoner spring flowers. But anyone who takes a trip to the woods this spring can begin to make his own literature by keeping notes on the kinds of plants he finds growing together. With this sort of start, you can begin to make your own contribution to the ecology of your neighborhood.

The following list of books on wild flowers is suggested to those seeking wild flower guides or other reference material. Some of these books are out of print, but are usually available on the shelves of public libraries, or from dealers in second-hand books, particularly those specializing in natural history books.

Wild Flowers, Homer D. House, The Macmillan Company; *Illustrated Flora of the Northern States and Canada,* Britton and Brown, Scribner; *Field Book of American Wild Flowers,* F. Schuyler Mathews, G. P. Putnam's Sons; *Wild Violets of North America,* Viola Brainerd Baird, The University of California Press; *How to Know the Wild Flowers,* F. T. D. Parsons, Scribner; *Our Early Wild Flowers,* H. L. Keeler, Scribner; *Wild Flowers of the Alleghanies,* J. E. Harned, published by the author at Oakland, Maryland; *Florida Wild Flowers,* M. F. Baker, Macmillan; *Illustrated Guide to the Flowering Plants of the Middle Atlantic and New England States,* G. T. Stevens, Dodd, Mead; *A Guide to the Wild Flowers East of the Mississippi and North of Virginia,* Norman Taylor, Greenburg; *Nature's Garden,* Neltje Blanchan, Doubleday; *Our Wild Orchids,* F. Morris and E. A. Eames, Scribner; *My Wild Flower Garden,* Herbert Durand, G. P. Putnam's Sons; *Guide to Wild Flowers,* Alice Lounsberry, Frederick A. Stokes Co.; *Book of Wild Flowers for Young People,* F. Schuyler Mathews, G. P. Putnam's Sons.

As We See It

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Ducks Unlimited Struts Again

First prize in the Department of Overstatement goes to S. Kip Farrington, Jr., whose article in *Maclean's,* a Canadian magazine, is condensed in *Reader's Digest* for February, 1946. We quote the latter's opening paragraph as ample evidence that the award goes to Mr. Farrington, who says:

"Less than ten years ago, North America's vast wild duck factory, which stretches across three prairie provinces of Canada and north toward the Arctic, was teetering on the edge of bankruptcy. Today it is noisily solvent again. The quackers owe their comeback to an organization called Ducks Unlimited, which since 1938 has boosted the continent's duck population by 500 percent."

In 1939 and 1940 we called attention to similar exaggerations and misleading statements in the publicity of and about Ducks Unlimited. We were accused by members of the organization of being unfair to them, yet some of the men doing the actual work agreed that many of the claims of Duck Unlimited were extreme. They blamed an over-enthusiastic publicity department. During the war years its propaganda was relatively restrained. It appears now, however, to have taken on its old character, as is evidenced by the article here quoted, and the appearance of a book entitled *The Ducks Came Back,* also by S. Kip Farrington, Jr.

What, precisely, are the facts? By the early 1930s the migratory waterfowl population of North America was reduced to a tragic degree. This had come about as a result of long years of over-shooting, the use of live decoys and baiting (called feeding by its proponents), and by a succession of years of drought in breeding areas in the northern United States and southern Canada. A closed season, or a series of closed seasons, was recognized by conservationists as best for the birds. But this would have cut off revenue from the sale of licenses by the States, and income from the so-called duck stamp for the Federal Government. So seasons and bag limits were cut, and other restrictions were imposed. At the same time the Federal Government, through the U. S. Biological Survey, which, since 1918, had administered the Migratory Bird Treaty Act for this country, began expansion of a Federal refuge system to provide breeding and wintering grounds for the migratory waterfowl in the United States.

General conditions improved and the birds started a slow comeback. However, duck shooting restrictions remained severe, for great areas in northern Canada remained untenanted. So, in 1937, Ducks Unlimited was set up by gunners, then organized as members of More Game Birds in America, Inc. The avowed objective of the new group was to raise money to be expended in Canada to restore waterfowl habitat. Drought, drainage and agricultural development had dried up marshes, ponds and potholes in the prairie provinces of Canada, where an important percentage of the migratory waterfowl had originally bred.

An excellent job of money-raising was done, and an extensive program was initiated. This program has done much good. It has unquestionably made an important contribution to restoration of waterfowl numbers. It has also materially benefited farmers in the provinces affected. In fact, Ducks Unlimited may well be proud of what it has done. It has no need to resort to the ridiculous claim of having done it all; to pose as being the sole caretaker of migratory waterfowl.

Such misleading publicity ignores the fact that between 15 and 20 percent of the ducks and geese breed in Alaska; that vast breeding grounds and plentiful water exist north of the prairie provinces, and that these grounds have been extensively and traditionally used by breeding birds. Such propaganda also ignores the important place of the many large natural refuges in our Federal refuge system. It ignores the better natural conditions that have existed ever since the birds started to come back.

In its publicity Ducks Unlimited has also made much of its campaigns against predators—crows, magpies, ground squirrels, northern pike and others. Man has always been the greatest predatory influence so far as migratory waterfowl are concerned, but Ducks Unlimited, being made up of and supported by gunners, naturally says nothing of this, ignoring also the patent fact that the former tremendous waterfowl populations were developed in the face of these natural checks.

We could laugh off all these extravagant claims as over-enthusiasm were it not for the ulterior motive that lies behind them. This motive is very simple. The object is to anchor in the public mind the conviction that ducks and geese have been brought back *solely* by the duck hunters and their money. This being the case, the ducks are *their* ducks; they are entitled to bigger bags, longer seasons, and more privileges. That they are now ready to collect this dividend from an activity that is part achievement and part hot air is revealed in the book, *The Ducks Came Back*. There the immediate return of live decoys, shooting over baited waters, and batteries and sink boxes is urged.

The migratory waterfowl are in no state for such devastating attack. In January Dr. Ira N. Gabrielson, Chief of the U. S. Fish and Wildlife Service, on the basis of a survey of the situation, stated that the waterfowl population was about 125,000,000 at the opening of the 1945 season. (Ducks Unlimited claims 140,000,000.) A record-breaking number of hunters were afield in 1945, an increase in number of about 25 percent. The 1945 sale of duck stamps will hit one and three-quarter millions. Yet most of the duck areas experienced a smaller flight than for the previous year, and the kill was heavier.

"It is obvious from this survey and from other reports coming in from our field men that waterfowl are not increasing in numbers as fast as waterfowl hunters," declares Dr. Gabrielson. "Next year the situation can be expected to be even more serious. More men will be released from military service and more ammunition will be available; but I doubt if there will be more ducks."

In the face of such facts the specious propaganda of Ducks Unlimited is ill-timed and dangerous.

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Mr. Ickes Resigns

DURING his long term of office as Secretary of the Interior, we have often differed with Harold L. Ickes, sometimes violently. At the same time, we have always regarded him as an honest public servant, an able administrator and an interesting individual. More than this, and from the viewpoint of the conservationist, Mr. Ickes has been the best Secretary of the Interior in the history of that Department.

More often than not, the post that Mr. Ickes filled so long and so well has been occupied by a purely political appointee. Rarely has the Secretary had any real interest in, or concern for, conservation of natural resources. On occasion the incumbent has abetted, if not aided, plunder of these resources.

During Mr. Ickes' thirteen years in office he has extended and strengthened the country's conservation program. He has furthered public appreciation of its fundamental and vital importance. Mr. Ickes will be missed, and we are truly sorry to see him step down as Secretary of the Interior. Oblivion, however, is not consistent with his character or his inclinations, and Harold L. Ickes will continue to be heard from, we are certain, and, we trust, in the field of conservation.

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Shall It Be Stardust?

By PAULINE STARKWEATHER

("Monkeying with the atom," says George Bernard Shaw,
"may explode the world into a cloud of stardust.")

Must he destroy, let man kill man that kills,
But not this garden of the solar skies—

Not the still woods with darts of amber falling
Diagonally; not the boisterous tune
Played on the trumpets of the daffodils,
The bluebell carillons, and the birds calling;
Red roses tumbling pell-mell into June;
The long tranquillity of summer days!

Perhaps there is no other sea . . . no sea . . .
Charging the land with foamy fetlocks gleaming,
Champing a rocky bit . . . no gray gull screaming . . .
No lyric wings careening down the sky!

What if there is no autumn?—only here
The pale blue prayers from autumn's altar fires,
And the keen perfume of chrysanthemums;
On earth alone the tang of autumn air,
The brilliant vestments of her forest choirs.

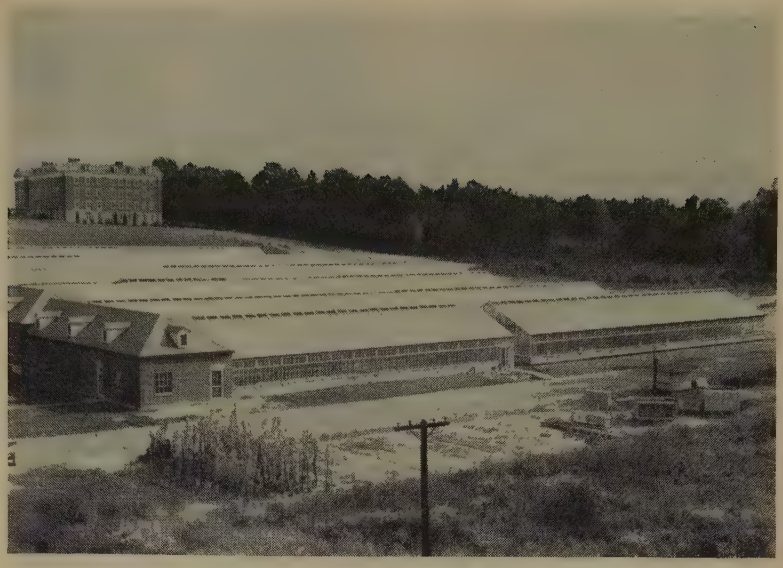
And are there crystal flakes when winter comes
To any other sphere? Is there a hill
So white? Is there a forest quite so still?

* * *

Let man kill man if he must be so base,
But save this garden for a nobler race!

Eden at Beltsville

By EDWIN D. NEFF



Part of the six acres of greenhouses at Beltsville, Maryland, the main nerve center of plant-creation research in the United States. There are 1400 acres of experimental land, complete laboratory service and a modern cold-storage plant.

IF ADAM had possessed the viewpoint of a Department of Agriculture scientist, he would have been miserable in the Garden of Eden. He would have declaimed apple trees attractive to snakes, and perhaps would have tried to breed a snake-repellant variety. Then he would have tried for bigger and redder apples.

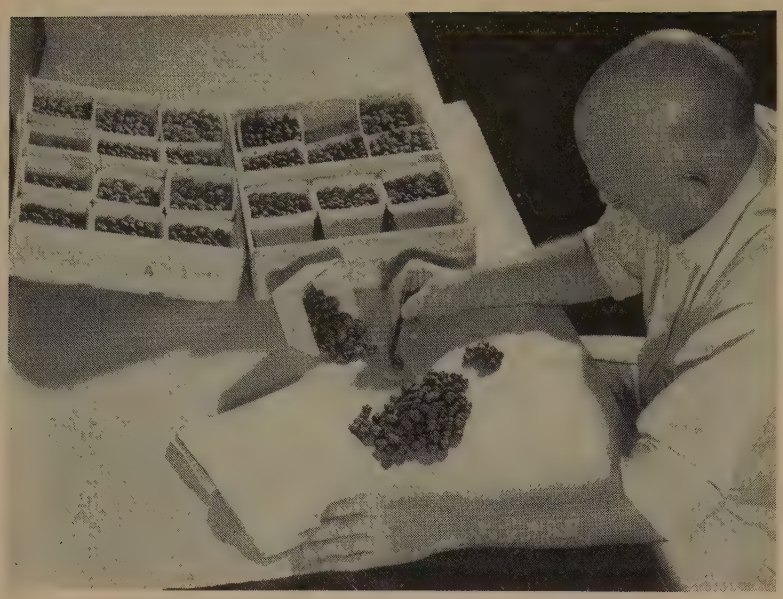
Ever since that wonderful Garden was declared out of bounds, Adam's sons have been trying to recreate it, or, more accurately, to grow a better one. Like the ancient alchemists, the plant scientists dream of golden fruit to emanate from the base specimens they find blooming wild in the fields. When Darwin came to be better understood, Burbank had gained worldwide fame as a plant breeder, and Mendel's laws of genetics were rediscovered, there had grown up a solid basis for the plantmen's dreams. They discovered the magic of genes, the tiny elements of inheritance that pass good and bad characters from generation to generation, and took a direct hand in plant breeding themselves. Modern plantmen do not merely select good types, cause them to breed true, and then replace old types. They actually create new types—better than anything that went before, and more resistant to disease.

Today some 300 scientists at the Department of Agriculture's Bureau of Plant Industry, Soils and Agricultural Engineering at Beltsville, Maryland—a few miles from Washington, D. C.—are the main nerve center of plant-creation research in the United States. Their work is intimately connected with experimental stations in every State, with commercial and endowed research organizations, and with foreign governments.

The equipment at the Bureau includes six acres of greenhouses, 1400 acres of experimental land, complete laboratory service and a modern cold-storage plant with temperature and humidity controls in sixteen rooms. The annual budget is around $5,000,000—a small fraction of the value of the research.

In the Bureau's official language, its purpose is to reduce costs and hazards of crop production, insure ample supplies of high quality foods, minimize marketing hazards, improve crop and soil management and promote crop control by men. The officialese is dull enough; but when the results are seen, there is real drama at Beltsville. Can you imagine a blueberry more than an inch in diameter, produced by years of experiment with the pea-sized berries in the wild? There are selections of such berries at the Bureau, but they are not yet on the market, or even named. They are known by number. And the limit is not predictable, according to the man who helped develop the one-inch berry, Dr. G. M. Darrow, senior pomologist.

The tall corn grows at Beltsville as well as in Iowa. A scene in one of the greenhouses where work is carried on in breeding corn hybrids for resistance to disease and greater yield.



A blueberry one inch in diameter has been developed, and other amazing things are done with this berry. Here Dr. George H. Darrow, blueberry specialist, compares the fruits for their keeping qualities in storage.

The story of these amazing Concord-grape-sized blueberries begins in 1906, when Dr. F. V. Coville of the Bureau began experiments with the culture of the highbush berry. In those days all blueberries grew wild; they had been an important small-fruit crop since colonial times, but attempts to cultivate the berry had failed. Dr. Coville discovered that blueberries die in rich garden or field soils, but succeed in distinctly acid soils that usually are left to brush and scrubby forest growth.

After three years of study, Dr. Coville began selecting the best wild plants and crossing them to produce larger berries. From 1909 to 1936, 68,000 pedigreed seedlings had produced fruit, and from these fifteen varieties were chosen and named. The berries Dr. Coville produced from his first crossings were about $\frac{5}{8}$-inch; after thirty years of patient cross-breeding he doubled the size of the berry. Since his death in 1937, three more varieties have been named and introduced.

Because of Dr. Coville's discovery that blueberries succeed on soils worthless for most other crops, a new industry has developed in New Jersey, North Carolina, Michigan and several other States. The blueberry crop in these States brought a sales price of about $2,000,000 in 1944 from land that had been thought nearly worthless. It is noteworthy that the approximate cost of the blueberry research from 1906 to the present was only $152,000.

Dr. Darrow and his associates are continuing Dr. Coville's work. Because of the foundation he laid, they can proceed much more swiftly. New problems have come up. A berry canker in North Carolina was giving trouble, but a canker-resistant berry has been developed. A virus disease, similar to the tobacco-mosaic disease, is attacking some plants, but one variety that resists the virus has been developed. Insect attacks came, and an insect-resistant variety is under study. Blueberries that ripen in August and September rather than July are being developed. There are still more wild blueberries on the market than cultivated berries, but the tendency is toward the man-made varieties.

Agricultural researchers like to think of their laboratories as a giant alembic in which the raw stuff of Nature is distilled into better and better fruits and grain for the world's tables. As scientists they understand neither they nor any man yet to come can change one of Nature's laws; but, knowing those laws, they can place their machines at Nature's crossroads and catch her on the go. They can outpace the slow performance of time.

As scientists, they have a deep love for pure research that is indifferent to profit. But they are human, too, and like to see their research turn up a vein of pure gold.

No better example of strictly academic, but subsequently profitable, research can be found in agriculture than the famous corn hybrids. Early in the century, Dr. George H. Shull selected, as an inheritance factor worth study, the number of rows in corn ears. He found the number varied widely, not only from plant to plant of different kinds of corn, but on ears of the same plant. He began inbreeding to get uniformity in the numbers of rows per ear, and succeeded. He was only trying to prove that uniformity of kernel rows is an inheritable character. But he found out something else. The inbred lines were more vigorous than their polyglot parents. Once he got the inbred lines to produce true, or consistently uniform, he selected the better varieties and crossed them to produce still more vigorous hybrids.

Dr. Shull's work was taken up by the Department of Agriculture in 1915 and its results were so impressive that in 1920 money was appropriated by Congress to promote corn hybrids in cooperation with corn-belt stations in Ohio, Kansas, Missouri, and later Illinois.

With a large corn hybrid program started, enough seed was available to speed further research. The method was this: A given variety of corn with a desirable character, such as resistance to disease, was selected and bred true. Then another inbred variety with another good character, such as high yield, was crossed with the first to produce a hybrid resistant to disease and a good producer.

The big contribution of the Department's Bureau of Plant Industry, Soils and Agricultural Engineering was to promote corn hybrids throughout the corn belt. Yet the natural lag of farming behind research

William S. Porte is the originator of the new tomato, Pan America. It was evolved by crossings with Marglobe and a wild currant tomato found in Peru and brought to this country for its resistant quality.

delayed until 1933 the first appreciable acreage in corn hybrids. By 1945, however, 64 percent of the total corn crop was hybrid. Stated simply, the result is more corn produced on less land. The Bureau estimates that corn production was increased fifteen to twenty percent by hybrid varieties, or about three-quarters of a billion bushels per year. Corn is America's most important food crop.

Probably no one has more enemies than a plantman, nor more tireless ones. Among these are the plant diseases. They seem to have entered a conspiracy against agricultural science just as real as the laboratory conspiracy against disease. For as soon as a plant is developed that resists a specific disease, Nature starts to design new weapons to defeat that resistance.

It seems to make no difference to Nature whether the plant or the disease wins. It is the old story of survival of the fittest. But it is the plantman's job to help his subjects win.

At Beltsville there is a "death bed" for tomato plants. It is a large box filled with moist soil kept at 80 degrees by electric coils, and an ideal spot for fusarium wilt, a fungus deadly to most tomato plants. The roots of a young plant are dipped in the fungus suspension, then planted in the "death bed." Unless the tomato is highly resistant to the wilt, it soon withers and dies.

The "death bed" is useful in developing and testing plants for wilt-resistance, and it has been eminently successful. From these experiments came the famous Pan America tomato, now well distributed throughout the United States and a big money-maker.

Pan America is a patchwork quilt of genetics—a perfect example of plant breeding to defeat disease. Some time back, the Marglobe tomato was developed by crossing the Marvel, resistant to wilt and nail-head spot, with the Globe, susceptible to both diseases. Globe was the most popular commercial variety of the winter tomato area in Florida. The fruits of Marvel were too small, but in the new cross, the larger fruit size of the Globe was combined with the disease resistance of Marvel.

Then a small, wild tomato growing in the Peruvian cane fields was found by the Department's Division of Plant Introduction. There was no sign of wilt on any of the plants, and it was turned over to the men who were looking for an improvement on Marglobe. They inbred the new Peruvian plant, checked its wilt-resistant character in the "death bed," and crossed the wild plant with Marglobe. This was done by removing the anthers from Marglobe before the pollen matured, then placing the pollen from the wild tomato on the Marglobe flower. This produced the first hybrid, which was promptly backcrossed with the Marglobe to produce the second and third backcrosses to keep building up the fruit size. Resistance to wilt was of course carefully checked each time to make certain this property was not lost during hybridization.

When the third backcross was reached, large populations were grown and the best plants selected from these. Progenies of the best plants then were produced as a final check on wilt resistance, size and quality. The result was Pan America, now well distributed and highly popular.

While plant crossing is certainly the best known aspect of the fruit and vegetable research at Beltsville, it makes up only one-third of the total work. Nutrition of crops, and soil management studies, development and testing of rootstocks for fruit trees and the causes and control of disease-fungus, bacterial and virus, fill in the picture.

There is no space here to tell the whole story of the Bureau's work. It encompasses the whole range of growing things, from analysis of the soil itself to the best means of wrapping and shipping the fruits and vegetables finally produced.

One branch, however, graphically depicts the variety of effort at Beltsville. This is the cold-storage plant where the effects of growing practices and the date of picking, on storage quality of apples and other fruits are discovered. These efforts are almost entirely commercial, the heaviest emphasis being on practicality.

To illustrate, let us choose the cantankerous apple that caused the original Adam so much trouble. Apple dealers were surprised to find that cold storage, far from protecting, seemed (Continued on page 220)

Deep in the Great Dismal

By ALLAN and ELLEN BONWILL

WHEN we first saw pictures of the Great Dismal Swamp, the mystic charm, the magical unreality of its appearance, captured our imaginations. When we first saw the swamp itself, we lost our hearts to its golden-brown sweet water, its tangled jungle-trails, its wealth of birds and reptiles, its impenetrable twining vegetation, its gray-green cypresses embroidered with the October gold of Virginia creeper, and, above all else, its incredibly perfect reflections.

There was no choice open to us—we *must* know more about the Great Dismal.

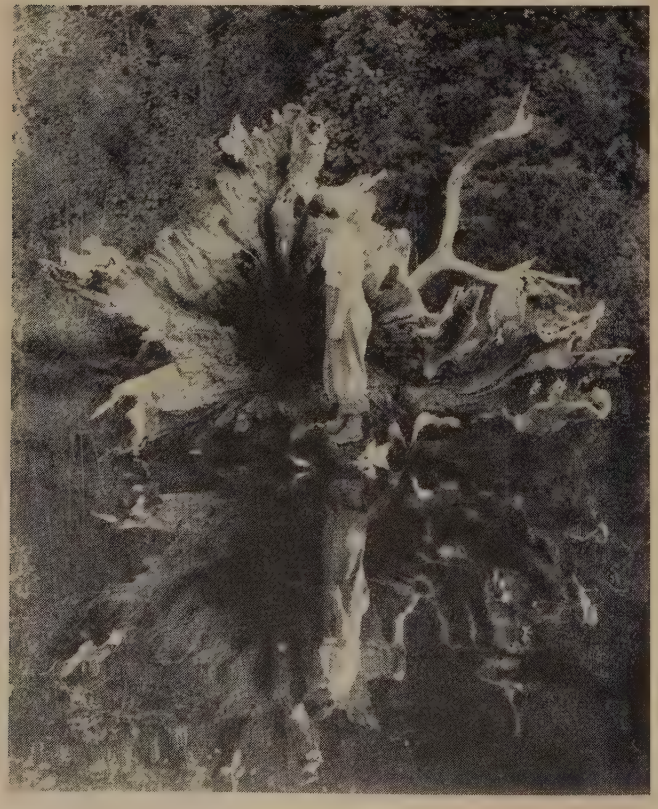
Man's understanding of any geographical region rests basically on his understanding of the underlying reasons for its being. The geologic formation giving rise to any territory determines, within the limits of climate, what its natural history shall be. To the man who knows nothing of its roots, a tree is an enigma. Knowing the root structure, and seeing the rest, the component parts become a comprehensible whole. So it is, also, with the Great Dismal Swamp.

Here, we find, we are on an ancient sea-floor, laid down in Pliocene times; in a shallow, quiet sea, when the area, which is now thirty-five feet above sea-level, was one hundred feet lower than at present. The deposits contain species of shells that are now extinct. The perfect preservation of many of the shells, fragile though they are, indicates that there were few rough winds or currents in the area at the time the sedimentation occurred. Judging by the species, many of which are like those now found in warm waters, indications are that the deposits were formed in preglacial days.

Cypresses, with great twisted boles and earth and vegetation resting on their patriarchal knees, rise above the water's surface.

On the western or landward side of the swamp area is an ancient escarpment, an old sea-bench, forming the boundary known as the Nansemond shoreline, extending from Suffolk, Virginia, to Albemarle Sound, on the south. On the eastern or seaward side, the area is hemmed in by low dune-like elevations, only a few feet high, but serving, in a measure, to retain the swamp waters upon the surfaces where they lie. The swamp itself is one of that group of inundated lands along our south Atlantic Coast, where lack of drainage results chiefly from two factors—an original deficiency of slope, and the retarding action of the dense plant growth of the region.

The coastline is deeply cut by the fiord-like mouths of the deep-watered Little, Passaquotonk, and Pequi-



A great cypress, hollow for its entire length, had been uprooted by some long-past storm and lay mirrored in the topaz water of the lake's edge.

mon rivers. Once, geologists say, this entire area must have been at a slightly higher level than at present. They base their opinion on the evidence offered by the present depth of these stream beds.

Geologically, then, the swamp is an elaboration of a spring pocket on a hillside, with a height of land behind it, some impervious-to-water strata below it, and, ringing it in, a dense growth of water-loving plants, forming a matted tangle through which the clear water trickles slowly away. The escarpment on the landward side, the sedimentary sea-bottom strata underlying the area, the sand dunes on the seaward edges, and the densely-tangled growth in and about the swamp result in a similar slow flow of water from its vast reservoir out through the channels of its many rivers.

Trees arched to form a green tunnel of Portsmouth Ditch, the water, like dark brown satin, reflecting each twig and branch.

The plant growth is typical of a swamp. Trees are the dominant form, as opposed to the grasses that predominate in a marsh. Here a land as much water as soil supports best those trees adapted by Nature to a wet location. The water-saturated soil leads to strange artifices on the part of the trees, in their attempts to obtain air for their root systems. The gums are shallow-rooted, with knobby, matted root-systems spreading over the top of the ground. The cypresses, majestic giants of the swamp, send up great knees when they grow in mucky soil, or, in wetter locations, grow roots above water, or land, making an obese enlargement of the trunk for several feet above water level.

There are two million acres in the Great Dismal Swamp, with Lake Drummond, a shallow subcircular lake about 2¾ miles in diameter located not far from its center. Seven streams are said to flow out of the swamp, but apparently none flow into it. It is a vast reservoir, not alone of water, but also originally of birds, wildlife of many other sorts, and luxuriant plant life.

The feeder canal, through which we entered Lake Drummond, is a straight, man-made canal, facing almost due west. It was not a quick trip; rather, a slow, gentle progress to the rhythm of our dipping paddles in the slowly-moving brown water. The canoe was well loaded, with just space for the three of us to sit—Allan, Ellen and son Michael, aged four. We had to pass the lock, by which larger craft enter the lake. Here we obtained permission to camp, and advice from the lock-keeper. Our little craft was reloaded by friendly hands on the lake side of the lock, and we turned our bow upstream again. We found it was wilder there. The canal was narrower, trees leaned to meet each other, green still above the brown water, although it was late October. Showy-berried shrubs glowed, magenta, crimson and blue, in the undergrowth; catbrier, and bright-leaved Virginia creeper, more luxuriant than we had ever seen it before, clambered into the tree-tops, forming tangled thickets, where many birds flitted about, heard more than seen by us below. The rich aroma of fox grapes hung heavy on the warm air, sweet with the heat of the late afternoon sun.

Framed at the end of the vista, we glimpsed the brilliance of the sun on Lake Drummond. A glorious sight was waiting, as we entered the lake. Sunset, on mysterious Lake Drummond! The sun, a great golden ball in an inverted blue bowl, was reflected in the still, brown mirror of the lake. While we watched, entranced, the long shadows around the margins spread and deepened, and darkness stole out of the swamp to the lake.

A hasty supper, eaten as we paddled, kept us from starving. When we had finished, the stars were out, the Great Dipper's seven jewels hanging low before us in the sky. It was a velvet darkness. The moon was not yet up, and the stars shone with an unusual brilliance. The black water and the night sky blended in the distance.

"Steer for the North Star," the lock-keeper had said, "and you'll come to Portsmouth Ditch." Such a prosaic name for such an enchanted waterway!

Straight to the North Star we pointed the bow of our canoe. The stars paled as we paddled, and the moon rose, a full moon, brightening the whole wide expanse of the lake. Now we could see the trees along the edge of the lake, the strange shapes of the stumps in the water, and their shadows. There was more than a bit of danger. How would we get back to solid land if we should damage our canoe? Miles of water, miles of swamp, surrounded us.

Still following our star, we paddled, and, after an

A stretch in the great barge canal. Part of the water to maintain this waterway at a usable level comes from Lake Drummond in the Great Dismal.

hour or so, a deep V showed in the darker darkness of the wooded shoreline ahead. Sure enough, there was an opening, and, to the left of the V, we could dimly see a lighter rectangle—the roof of the cabin we were seeking, white in the bright moonlight. It was only a matter of minutes from the canoe to moderately comfortable sleeping arrangements on the screened-in porch. Michael asked if he could hook the screen door. He had remembered the lock-keeper's word: "Plenty of bear around Portsmouth Ditch." An owl hooted in the darkness, and far off, somewhere behind the cabin, a hunting dog pointed his nose at the full moon, now high in the sky, and howled mournfully.

The moon rose higher, its white light dimming the stars, its reflection making a silver path on the dark water. I awoke several times, and sat up, shivering in the cool night air, to watch its eerie beauty. The moss-hung cypresses were ghostly in the silver light, and the black stubs and stumps seemed like strange water-monsters, just emerging from the lake. Between one and two o'clock, the moon set. I woke Allan and we watched it together, across the mysterious darkness of Lake Drummond, where some water creature splashed now and then, a silver sound in the quiet night. We have seen many moons rise and set, in many places outdoors, but the strange beauty of this night lingers still in our memories.

It is indeed a lake of mystery. It gives a strange impression—a circle, tree-rimmed, miles across, and no work of man's hand visible upon its whole circumference. You seem always to be a little higher than the horizon, which makes you feel a little peculiar to start with, since, on water, we usually feel the other way—lower than the rest of the world. Then the water, instead of being blue or green as is most of the water we see, is a golden coffee-color, so dyed by the roots of the juniper trees that grow about its edges. It is sweet and healthful, tasting a bit like sassafras tea. Ships, long ago, filled their water-casks with swamp water. It kept sweet for long voyages. Allan and Michael loved it, dipping up a cupful of the amber liquid every now and then as we paddled along, but as for me, I drank from the water-jug we had brought with us.

Strange fish are reputed to live in the water of this lake. Even as we watched, early the next morning, a boatload of hunters swerved from their course, amid exclamations of "A six-footer, by golly!" "Say, did you see that one?" ". . . leaving a wake like a torpedo boat!" A great gar-fish had crossed their bow. A six-foot fish, with great bony jaws; the men in a light, twelve-foot wooden boat! What if they had met, at high speed? The hunters paused, to ask if we had seen anything of a dog. We remembered the lonely howl in the moonlight. Then, poking around the corner of the cabin, we saw a black and tan nose, which twitched and sniffed hungrily in our direction. A deer hound, lost in the previous day's hunting, he had been drawn into camp by the pleasant odor of our breakfast bacon. We fed him a hearty bowl of oatmeal, and a bacon sandwich, and tied him up at the doghouse back of the cabin, to wait for his owner, who the hunters said would soon be along.

Back to our interrupted breakfast we went, to turn from it a moment later at Allan's exultant shout, "Look there—up in the sky!" Transfixed we stood, as two great bald eagles swept powerfully across the sky, their tawny dark wings cutting against the blue, their white heads and tails shining like silver in the sunlight.

Breakfast over at last, we explored that green tunnel called Portsmouth Ditch. The water everywhere was like dark brown satin. Its darkness made it a perfect reflecting medium. Each leaf, each tiny twig on the bank was mirrored exactly in the water below it. We could scarcely tell the reality from the reflection. Several times we had to look twice to be sure that we stepped on the stump or log, and not on its mirrored image.

Farther back in the swamp, up Portsmouth Ditch, the trees arched nearly across the water, making a closed-in green pathway through the jungle-like swamp. Wild grape and cat-brier grew in dense tangles along the banks, climbing into the trees, and trailing gracefully down almost to the surface of the water. There was a vague sense of unreality about the scene. The utter stillness of the brown water, the density of the tangled growth upon the banks, the extreme waiting quiet, broken only by the far halloo of some hunter's horn (Continued on page 220)

Peach Red petunia, an All-American for 1946.

PHOTOGRAPHS FROM BURPEE

Double portulacas. They grow wherever they can find a place to send down roots.

Tetra snapdragons, a new horticultural creation.

Annuals, Gay and Cooperative

By ANDREW S. WING

WHEN ONE thinks of flowers he thinks of those he has known well, usually in carefree days of childhood. I remember the sunny little bed of portulacas at the turn of the driveway on the farm where I was born. Their bright faces, turned toward the sun in a myriad of colors, aroused my interest in flowers at an early age, and perhaps influenced my thinking towards them.

Then I spent two happy years in the trial grounds of the family seed firm, constantly amazed at the number of varieties, and the ease with which most of them could be grown and flowered on ordinary fertile farm land. Then, returning to business after service in World War I, I found special joy in having a bit of a garden again. Zinnias, marigolds and calendulas I particularly remember as having brightened our tiny dooryard in those days. Zinnias and marigolds are good things to have in anyone's garden—bright, gay and easy to grow with reasonable care, and with a multitude of varieties, shapes, size, form and color. Zinnias are much finer today than they were in my younger days, but they are no grayer, really, than some of the older sorts, particularly such dwarf forms as *mexicana.* With its dainty small flowers, this variety is still desirable and not too well known. The giants are of course magnificent, but there are many others, including those with pastel shades and interesting, twisted forms. You will need several packets of zinnia seed if you are to have an annual garden, even a small one.

Super Giant zinnia, and, below, mixed California poppy.

Mammoth Mum marigold and, below, yellow and orange cosmos.

PHOTOGRAPH FROM J. HORACE MCFARLAND

Zinnias in an annual garden contribute a variety in color and size. Plantsmen have developed a multitude of varieties that are bright, gay and relatively easy to grow, and some of the older sorts are equally attractive.

What is an annual? A plant that grows from seed, flowers and dies in the same season. Yet a number of plants are so classified that are not truly annuals, such as ageratums, snapdragons and four-o'clocks. It just happens that they are tender perennials and are better treated as annuals by giving them an early start.

Started in a window box, a coldframe, or in a hotbed, many of the annuals can be brought to flowering size after they are moved outdoors in the North in late June or early July. Of course, a greenhouse is even better, and there is always the neighborhood florist or seed store to supply you with early plants as soon as the ground is warm and weather settled. It is rather more fun to grow your own, and by so doing a single packet of seeds will often supply you with hundreds of plants. The satisfaction of choosing the varieties and colors desired more than repays the effort.

Like any other group of plants, flowering annuals require a rich, well-drained, mellow soil to reach perfection. They will not stand neglect or abuse as well as some of the tough perennials, the roots of which go deep, and which have the entire year in which to draw strength from the soil. And yet some of the annuals are just about as foolproof as any flowers can be, if a reasonable amount of care is given.

For early spring bloom, of course, you will need the hardy bulbs, and other early perennial and biennial plants. After the peonies and irises fade, and the other glories of April and May and June have been shed, you can look to the annuals for a supporting cast for the balance of summer and until frost rings down the curtain for the gardening season.

To make a planting list, start at the front of your catalogue and run through—from alyssum to zinnias. Having marked everything that seems nice, you may find the list too long for the space available and you will do some pruning. My own list would be something as follows:

Sweet alyssum, either white or lilac for the front of borders and along paths. Easy to grow, quick to flower and long lasting as any annual, this little gem is a source of joy throughout the season.

Ageratum is another favorite, whether it is the dwarf or taller form. It will seed itself if permitted, and may even become a nuisance under favorable conditions.

Speaking of self-seeding brings up a really important fact about annuals—you can plant many of them in the fall and get earlier bloom in the spring. Or let them seed themselves. This is particularly true of calliopsis, corn flower, mullein pink, and a few of the other old favorites. Treated this way, some of the biennials and perennials will flower the first year almost as early as annuals. These include foxglove, Canterbury bells, hollyhocks, honesty and forget-me-not, although the conventional—and perhaps better way—is to plant them in July or August of one year for flowering the next summer. But in the larger garden, with corners left unspaded for chance seedlings, a surprising number of varieties may show themselves year after year. "Weeds" they may be to fussy folks, but to me the bloom they show early in the summer is an unplanned joy, and all that is needed is a little thinning and a mowing down with the sickle later on to make way for transplants from the later plantings.

Celosia, or cockscomb, is another annual that

PHOTOGRAPH FROM J. HORACE MCFARLAND

Sweet alyssum, either white of lilac, is a most effective annual for planting as borders or along paths. It is easy to grow, quick to flower, and its bloom lasts as long as any other annual. It is effectively used here.

sometimes invites itself to the garden year after year. If you like it leave it, otherwise the trouble of weeding it out is trifling, providing you know the difference between the weeds and the flowers. And that holds true of many of the self-sown flowers and garden "escapes."

But, getting back to the big five or six in the annuals, you can not overlook the calendulas with their superb coloring, and their hardiness after the nights become cool in September. There are many varieties, some of them superior to the old, but a good mixture will supply many plants at a reasonable price per packet.

The true marigolds, both French and African, are rich in new creations. Although strictly American in ancestory, these plants, like so many others, bounced back to us from Europe, hence their foreign names. Marigolds will provide a small garden by themselves. There are odorless varieties, too, for those who dislike the pungent scent. But most of us seem to like the robust aroma, as well as the strong colors of these old favorites.

Next on the list should go the petunias, with their great range of uses, forms and colors. Whether it be the dwarf varieties, so useful for beds and edgings, or the trailing ones that grace our window boxes, or the giant exhibition sorts, petunias belong in every good garden. Until recent years, the Japanese had a monopoly on the production of all-double petunias. American seedsmen and hybridists have performed miracles in overcoming this handicap, and we are now offered domestic doubles of real excellence. The latest—and probably the finest—of these is Colossal Shades of Rose, a true aristocrat bred by Burpee, but offered as the 1945 All-America silver medal winner by most seedsmen. Bright Eyes, a compact, single petunia, won a bronze medal and is conspicuous in its class. Its rosy pink flowers shade to white in the center. Blue, purple, and white petunias also have many uses. And there is a new shade of salmon blended with rosy cerise that is well regarded.

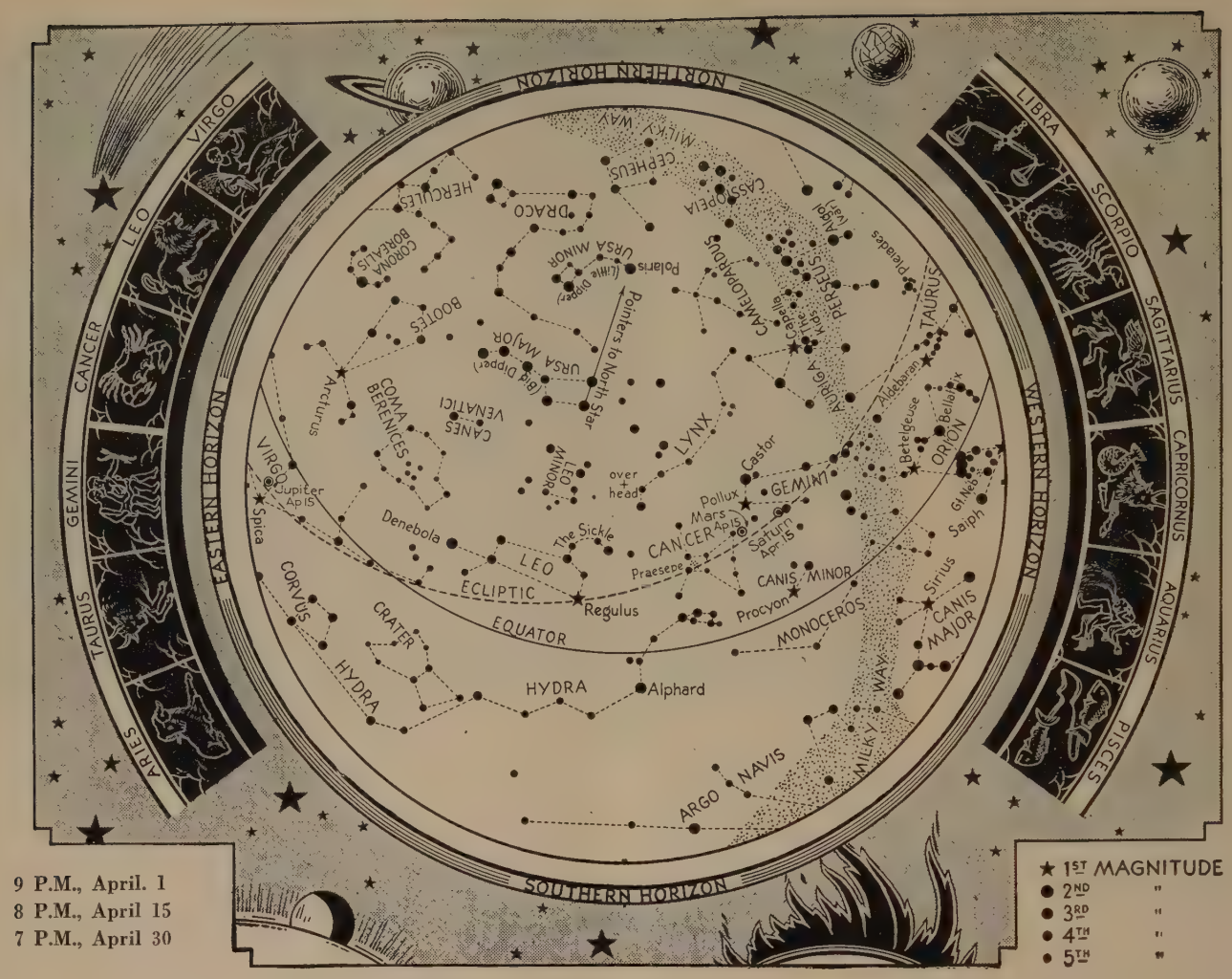
Another newcomer is the annual dianthus, Westwood Beauty, a pink that won honorable mention in the All-America list. The flowers are two inches wide, borne on stems ten to fifteen inches high. Colors range from fiery to a velvety red, with some lighter shades. Easy to grow and heat resistant, this dianthus seems to fill a real need in our gardens.

Snapdragons are extremely lovely flowers, both in the garden and the greenhouse. A new race of snaps has been developed by Burpee through the use of colchicine. The first introduction is named Tetra because of the doubling of chromosomes, which has resulted in flowers of great vigor, size and interesting colors.

We are now getting to a point where it is hard to choose the flower to place next. To me, at least, the cosmos is indispensable because of its height, graceful foliage and floriferousness. It is ideal for cutting too. There are earlier forms and giants. No annual planting is complete without cosmos in the background.

And what could be gayer that the California poppy, which is not a *Papaver*, but belongs to the genus named *Eschscholtzia*, from its famous discoverer. The single forms appeal to me most, as do most single flowers. Scatter the seed near the front of the border, or on a dry slope in the rock garden. The harvest of golden, yellow and almost red flowers will well repay you.

Asters are among the (Continued on page 219)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

A Great Sunspot Group

By ISABEL M. LEWIS

ON JANUARY 29, 1946, there appeared on the eastern limb of the sun in high northern solar latitudes a giant sunspot group. This was to become, within a few days, as it was carried by the sun's rotation across its central meridian, the largest sunspot group ever recorded.

The size of a sunspot group is measured in millionths of the sun's visible hemisphere. A spot group of 1000 millionths is considered large. It can be seen easily with dark glasses without telescopic aid. Spot groups of 3000 millionths, or more, are among the great of their kind. The last great sunspot group preceding this one belonged to the last sunspot cycle and was that of September 16-19, 1941. It attained an area of approximately 3000 millionths of the sun's visible hemisphere. This year's group, as it appeared on photographs taken at the U. S. Naval Observatory at Washington, D. C., by Mrs. L. T. Day with the 40-foot photoheliograph, had a spot area of about 6000 millionths, twice that of the great spot of 1941. Several globes of the size of the earth could be dropped into the umbra of the single largest spot that appeared in the photograph of February 3. An interesting feature of this one spot in the group was the brilliant bridge of light that spanned the dark umbra, a phenomenon sometimes observed in large spots. By February 7, when the group had passed the central meridian, the umbra of this spot had changed greatly in appearance and was almost separated into two distinct parts. Some spots within the enormous area covered by this great solar storm had completely changed in form and appearance during the four days that had elapsed. Some had disappeared completely, while other new spots had appeared. A sunspot group may change greatly in appearance in a few days, or even a few hours; thus study requires constant vigilance.

The sun, like the earth, is a great magnet, with its magnetic poles even closer to its poles of rotation than the earth's magnetic poles are to its poles of rotation. Intense magnetic fields exist in sunspots, and streams of electrified particles from sunspot areas penetrate the earth's atmosphere and cause magnetic storms on the earth, and auroral displays that may last for hours. Although all great sunspots do not set up magnetic disturbances, the great majority do so. During 56 years of observations of sunspot groups at Greenwich, England, between 1878 and 1934, nearly 12,000 sunspot groups were recorded. Of this number only 223 had an area more than 1000 millionths of the sun's visible area and were visible without the aid of a telescope. Only five attained an area exceeding 3000 millionths. Of the nineteen largest sunspot groups appearing between 1882 and 1928, all greater than 2000 millionths, only two were unaccompanied by magnetic storms upon the earth. During this period 58 magnetic storms were classified at Greenwich as "great," and, of this number, twelve were associated with sunspot groups listed among these nineteen great groups.

As was expected, the appearance of this record-breaking group of late January and early February, 1946, was accompanied by terrestrial magnetic disturbances that started in the early morning of February 7, after the group had passed the central meridian of the sun. A brilliant auroral display was observed even as far south as Washington. Auroras are caused by the bombardment of the rare gases of the earth's upper atmosphere, at elevations of 60 to 300 miles above the surface, by streams of electrified particles shot forth from the sun. The increase in the intensity of these displays, when great sunspot groups are near the sun's central meridian, indicates an association of the two phenomena. In the majority of cases it has been observed that magnetic disturbances on earth associated with the appearance of great sunspots appear within four days of the passage of the group across the central meridian. The great magnetic storm of September 16-19, 1941, began about seven hours after the group had passed the sun's central meridian.

One of the most remarkable and so far unexplained phenomena associated with sunspots is their reversal of polarity with the sunspot cycle. Sunspots usually occur in pairs in which the leading spot, or group of spots, will be opposite in polarity to the following spot, or group, like the two ends of a horseshoe magnet. The polarity of the leading group in the northern hemisphere will also be opposite to that of the leading group in the southern hemisphere. This condition persists throughout the entire 11-year sunspot cycle. As the time of sunspot minimum approaches, spots of the new cycle begin to appear in high latitudes of the northern and southern hemisphere, and there will be spots belonging to both cycles on the sun at the same time, those of the old cycle in low solar latitudes, and those of the new cycle in high latitudes. It is characteristic of a sunspot cycle that the individual spots and groups first appear in high latitudes and gradually work downward toward the equatorial belt as the cycle progresses, the cycle dying out with spots in low altitudes. When the first spot of the new cycle appears it will be in high latitude north or south of the equator, and the polarity of this spot will be the opposite of spots of the old cycle in the same hemisphere, or the same as that of a spot of the old cycle in the opposite hemisphere. All spots of the new cycle appearing after this will show the same reversal of polarity. It may be said that the new cycle is ushered in with the appearance of the first spot with reversed polarity.

The first spot of the new cycle appeared on May 16, 1943, a small spot in the southern hemisphere, 41 degrees south of the sun's equator and covering only 194 millionths of the sun's visible surface in area. It showed the expected reversal of polarity characteristic of spots of the new cycle. The sunspot minimum, which occurs when sunspots appear in fewest numbers, came in February, 1944, nine months after the appearance of the first spot of the new cycle.

Up to the present time, with the new cycle not yet three years along, there has been no unusual display of sunspots or unusual activity on the sun. The sudden appearance of a spot of such record-breaking size is, therefore, most remarkable. One wonders whether, as the cycle progresses, it will show any of the characteristics of the last cycle, which was one of the most remarkable on record. It began in 1933, reached its peak of magnetic activity and size of sunspot areas in 1937, and in number of large sunspot groups (16 greater than 1000 millionth in area) in 1938, and ended in 1944. The number and area of sunspots appearing in 1937 were the greatest for any year, with the exception of 1870, since the records were started in 1832. The fifth largest sunspot group, since accurate measurements were started in 1872, appeared in October, 1937. Four years after the peak of activity was reached in 1937, the spectacular spot group of September 16-19, 1941, appeared, the second largest one of the cycle, and one of the most complicated in structure ever seen. It was accompanied by one of the most severe magnetic storms on record, and an auroral display that was visible as far south as Florida. The sunspot of March 24, 1940, however, was the one that was associated with the most intense magnetic storm ever re- (Continued on page 215)

Cutting a Celestial Rug

By COSETTE MIDDLETON

I wonder if the angels dance
On shoes with hob-nailed soles,
For every night the sky's expanse
Is full of silver holes.

The School Page

Edited by E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

SPRING FLOWERS IN SCHOOL

When we think of spring flowers and school, we are torn between adult concern for conservation of these beautiful parts of our environment, and juvenile emotions associated with running wild around a woodland trying to get a bigger and better bouquet ahead of competitors. We used these bouquets to court favor with our teacher and with certain much younger females. But I cannot remember a single experience in school or college that was consciously directed toward saving the rarer and more attractive of wild flowers. In high school, we made herbaria, and were "marked up" if our collection included rare species. In college, we were praised by our fellows if we brought in something rare, and our advice was sought as to where others could go and add similar specimens to their collections.

With myself, at least, a little light began to break about that time, and I began to realize that there was as much merit in saving as there was in destroying. Eventually I recognized that there was much more merit in saving.

Many game commissions encourage the shooting of the cottontail, because this is the most prolific game species left. They also import and propagate the pheasant, because our native grouse and quail no longer satisfy the needs of increasing numbers of gunners. Both practices result in an increased sale of licenses. By the same token, a theory has been built up that our native game birds have decreased because of predators, of which, they say, the crow is chief. Therefore—shoot, poison, and blast the crow.

With all this misplaced venom the native game birds continue to decrease faster than the crow, and the importation of cottontails from the West is a feature of game management policy in several eastern States.

Our ideas regarding the harvesting of our wild flower resources may well be revamped. Instead of rewarding collectors of rare species, we might well encourage the making of collections of species that have the qualities of beauty, food value, soil anchorage, or other factors that we recognize as having value. Also, we should insist that collections be limited to species that are abundant in our neighborhood.

It seems to me that what we do is largely determined by what we start out to do. If we start out to make a collection of rare plants, then we make a collection of rare things. But why is there not just as much merit on making collections of things known to be of food value; of those found most commonly on the lawns of the community; of plants found growing along the edge of a brook that would erode its banks were the plants not there; of species that can be used as emergency fiber, and so on? It seems to me that, if our school activities result in the disappearance of plants valuable to our region, it is partly due to the failure of the school to direct activities properly.

There are those who have contended that a complete, or at least an adequate, understanding of plants could well be satisfied by garden activities. This is unquestionably an important aspect of the field of Nature education, but it is not the whole picture. It is quite possible that, in cities, the school garden is the vehicle for the study of plants by children. A champion of this idea, Van Evrie Kilpatrick, died on February 9, 1946, and the work that he did to build up this idea in New York City schools is a monument to his memory. One wonders if, with his departure, emphasis may be shifted to the study of Nature through the medium of books. If so, it seems that we will be moving in the wrong direction. Kilpatrick contended that the spirit of his work was "to conserve for New York children everything that is left of nature in the city."

The Brooklyn Botanical Garden Medal for meritorious work was awarded to Mr. Kilpatrick, the citation pointing out that he recognized the small opportunity city children had "for the pleasure and fun that comes of growing things." It goes on to state that Mr. Kilpatrick's work represented "one of the finest and most needed pieces of educational work in the city." We pause here to join with the Brooklyn Botanical Garden in giving this credit where it is undoubtedly due, and to hope that the study of plants in our bigger cities will not tend to go away from the study of real, living plants, now that a defender of that idea is no longer on the firing line. It is to be hoped that his death may stimulate the support of the better parts of the program he so ably defended during the forty-three years that he was a teacher.

Like cows, many of our educators seem to think that the only grass worth eating is on the other side of the fence. City schools construct model farms, and one city school is considering the maintainance of a farm on the schoolhouse roof. In the meantime, country schools spend much time studying municipal water supply systems. Why we cannot learn to recognize the merit of our local environment is hard to understand. Certainly there is almost no community that does not offer rich opportunity for plant study on the spot. A vacant lot in a city may be as rich in offerings as a great state park near a rural school. Unfortunately, the chances are that the rural teacher has no greater recognition of the opportunity the park offers than the city teacher has of the vacant lot.

In a bare city lot, there will be weeds that are demonstrating in a superior way their ability to prosper under conditions of light, violence, heat and abuse—conditions that would eliminate promptly many of the plants that do so well under more favorable circumstances. Why are not these plants and their struggles used more as bases for lessons in our city schools? The answer probably is that the teachers, in their training periods, were not shown such areas because their teachers, in turn, had had their preparation largely in the artificial environment of the laboratory. The only remedy for such a situation is for teachers in service to get help from qualified leadership, or for groups of teachers to take the bit in their mouths and set out on their own to learn the possibilities of the community in which they live. So long as the United States mails still run, and so long as there are State Colleges of Agriculture, teachers should have little fear that they will be wholly stumped about identifying the plants that grow nearby. A numbered sample sent to the college for identification should, in most cases, bring a prompt and authentic identification for merely the cost of the postage.

And what goes for identification of things in vacant lots goes equally well for the identification of plants found out in God's open country. So really the only excuse a teacher may have is simply that she is too lazy to make the effort to find out what is going on close at hand.

It may seem that this article has wandered from the field of the study of spring wild flowers. This may be permissable since the insert section in this number of the magazine is devoted

Harbinger

By PAUL CHURCHER

Sure, an' this mornin' April awoke
To the fluttering beat of a butterfly wing:
Camberwell Beauty, Mourning Cloak,
Testing uncertain whims of spring.

wholly to the identification and description of eighteen of the better-known species. It is hoped that much of the material included in the chart section will be intriguing and valuable. Since it was written, the author has had much fun in asking many of his botanist friends if they knew anything of the poisonous properties of squirrel corn and dutchmen's breeches, and if they knew that cowslips were ever poisonous. The answers that came have indicated that even trained workers have their blind spots, and no matter how long we work in this field there will always be new and equally interesting angles that may be worthy of further investigation. The special insert in the center of this magazine may suggest various directions such inquiry can take.

A GREAT SUNSPOT GROUP

(Continued from page 213)

corded. The aurora of January 24, 1938, caused by the giant sunspot group of January 18, was the brightest display seen in England in 50 years. On March 20 of the same year appeared a detached eruptive solar prominence that rose to a height of 1,000,000 miles, the highest ever observed. Never has there been such a cycle, so far as is known, for record-breaking displays, size and number of sunspots, appearance of great eruptive prominences, and intensity of the magnetic storms and auroral displays that were induced in our own atmosphere. Whatever the present cycle may produce in the form of solar activity, it already has to its credit a spot group that will not suffer by comparison with any on record. It will be several years before the peak of activity for this cycle is reached, and from now until then sunspots and eruptive solar prominences and all other forms of solar activity will increase steadily.

In April Venus will be in increasingly better position for observation in the evening sky. It will be about 15 degrees above the western horizon at sunset the middle of the month. Mercury will be at greatest western elongation and visible in the morning sky before sunrise for a few days before and after April 23, but it will be near the horizon and poorly placed for observation. Mars is now near the meridian at sunset and sets about one hour after midnight, the middle of the month. It will pass from Gemini into Cancer in April. Saturn is now in Gemini just west of the meridian at sunset, the middle of the month, and sets soon after midnight. It is now brighter than Mars, which is decreasing in brightness. Jupiter will be in opposition to the sun on April 12, and is now at its brightest. It rises about sunset and is visible all night.

Starling Sagacity

There are those among animal students who deny any possibility of intelligence on the part of birds and mammals, holding that instinct is the ruling force. However, Alice B. Goodman of Columbus, Ohio, reports a little incident that seems to suggest more than instinct, and to indicate the existence of individuality in birds. Pieces of left-over toast thrown out to the birds brought two starlings. One starling chased the other away and started to peck at a piece of toast. It flopped around, making inconvenient pecking. So the bird stood on one end and pecked on the other. Temporarily satisfied, it flew to a tree to clean its bill and the other starling took over. The toast flopped around again, but the second starling did not think up the idea of holding the toast, finally departing. The first one returned, immediately stood on an end of the tidbit and went to work again.

Humane Trap

Many readers have responded to Lucy Furman's article on the steel trap in our February issue, asking how they can help, and requesting any additional information that may be available. In that connection we should mention a little booklet that has just come to hand. It is descriptive of humane "Havahart" traps, and describes trapping with such a live trap, the text being done by Wilford E. Sanderson, for many years on the staff of the American Humane Association. The booklet is available from Allcock Manufacturing Company, Ossining, New York.

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Camera Trails

By EDNA H. and WILLIAM J. EVANS

It is with a great deal of pleasure that we begin this photography department. Yet mixed in with that pleasure is a feeling bordering close to humbleness, since photography is such a big subject and one that is growing increasingly important in a wide variety of fields.

Banking is a business and medicine is a profession—both are of great importance and neither of them can be taken up merely as a pastime. On the other hand, while photography is a business, it is also a hobby enjoyed by many thousands of camera fans who take their pleasure seriously and devote quantities of time and study to it. Nature photographers are among the most ardent of these hobbyists, although there are a few professional Nature photographers also.

Our Graflex, like thousands of other cameras in the United States, has gathered more dust and mold than it has pictures in the past four years. Only occasionally, when time, opportunity and a stray film pack came our way, were we able to unlimber and fire away at some subject we felt warranted the expenditure of a precious piece of film.

Now, like many other camera fans, we are thumbing photography magazines, gazing longingly at catalogues and thinking hopefully of color film and the formidable assortment of equipment we hope to buy as soon as it becomes available again. We are thinking of new cut film holders and light-tight pack adapters to replace old ones held together with adhesive tape, of the flash gun attachment we never got around to buying before Pearl Harbor, of a tripod with a super-adjustable head, and a dozen other gadgets.

Already some makes of cameras and types of camera equipment are available in limited quantities, or their arrival is momentarily expected by dealers.

We are wondering just what new photographic developments will come out of the recent war, where photography certainly played a major role. The camera has become a weapon, as important in its field as the machine gun and the radio.

Mathew B. Brady gave photography its start in a military way back in Civil War days when he and his assistants copied maps for the U. S. Secret Service and "covered" the battles and leaders. This latter phase was a hobby since there was no photo-engraving process in those days and no way to reproduce the pictures. Brady carried his equipment in a covered wagon and processed his glass plates on the spot since every negative had to be developed within five minutes after exposure. But anyone who has ever pored over the ten-volume "Photographic History of the Civil War" cannot help but marvel at the results those early photographers got.

World War I gave photography another boost when it was found that the camera's eye could penetrate camouflaged positions that the human eye could not detect. Aerial photography was developed and special cameras and film were made to suit its requirements.

World War II was the best covered war the world has ever known. Cameramen served with the army, navy, marines, coast guard, air corps and all their numerous subdivisions. Photographers landed with the first wave of assault troops. They stayed on transports and pictured the men leaving and the wounded returning. Their lenses recorded daring rescues, exploding ships, attacking Kamakazes, disintegrating B-17s, and Messerschmitts going down in flames.

Cameramen flew with air armadas and photographed bombs as they burst. They went on reconnaissance missions both before and after bombing raids. They photographed WAVES, WACS, USO girls, privates and brass hats; seabees at work, engineers building bridges and demolition crews destroying others, fighting men relaxing in Red Cross clubs all over the world. They pictured the carnage and atrocities that follow in the wake of war. Every camp and air field had its staff of signal corps photographers. Every squadron had its photographers' mates. They took pictures on the ground, in the air and under the water.

V-mail letters were reproduced on microfilm. Photostatic copies were made of records. Highly accurate maps were pieced together from a maze of aerial photographs. Weighty decisions were made on the basis of photographs of objects half-way around the world from the men who did the deciding.

In hospitals at home and on the battlefronts other cameramen were busy photographing, in black-and-white and color, operations, autopsies, organs and portions of organs for medical records, wounds, infections, microscopic organisms—all the ills and ailments that can happen to the human race.

We know something of all this for one of us wielded a camera in an army hospital while the other received dozens of pictures having "local news value" over the desk of a certain newspaper. Even if there had been no shortage of news print, a paper could not have hoped to use more than a fraction of the "official photos" sent to it.

Every so often, in spite of the war, uniformed cameramen found time to take pictures that were not strictly in the line of duty. Unusual cloud effects crept in as backgrounds to B-29 pictures. Never-before-photographed peaks of the Himalayas, and snow-covered mountains in the Aleutians, were recorded on film, and the fact that they were useful in a military way did not keep them from being beautiful Nature pictures.

Take, for example, the ex-chief photographer's mate who carries a collection of kodachromes of Midway's coral reefs in his wallet. The reds and blues, browns and purples are something he will never forget and never tire of talking about.

While waiting for the capture of Wake, he and his mates from a sub-tender hunted octopuses in the shallows, learned about sea urchins' spines the hard way, fished in tide pools, and speared gorgeously colored parrot fish that became too curious when the men went down in diving helmets to photograph a newly wrecked submarine.

Nesting blue-faced booby and young on Midway Island. Duane Perkins, who took this picture, is typical of the uniformed cameramen who took pictures like this in line of duty, for photography played an important part in World War II.

Edna and Bill Evans are no strangers to the readers of Nature Magazine. Forming a camera-writer team, they have appeared often in our pages. Most recently, with Bill in the service, Edna has been doing some outstanding articles for us. Now we are happy to welcome them as joint editors of the "Camera Trails" department. Theirs is a real collaboration, starting with a common interest in Nature, which led to the altar. Now they take turns at the typewriter and behind the camera, and will draw upon their varied experience in outdoor photography for the benefit of readers of Nature Magazine.

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The nesting terns and gannets on Pacific atolls were photographed in every phase of their daily lives, as were the gooney birds whose antics added humor to the otherwise monotonous life on tiny island airstrips. Filmed also were monkeys, pythons, water buffaloes, lizards, honey bears, kangaroos, sea lions and dozens of other creatures American service men had never before dreamed of meeting outside a zoo or circus.

With photographers playing such an active and vital part in the war, there is little wonder that civilian hobbyists found camera supplies increasingly hard to get between Pearl Harbor and V-J Day. Without a priority, they were hard pressed to keep their hobby going.

Of course the foregoing has little to do with the subject of Nature photography. Yet, knowing all the ways in which cameras and film were used during the war, we are looking forward to improvements that may have bearing on our cherished peacetime hobby. A great many photographic developments that were strictly "hush-hush" during hostilities should soon be finding their way into camera stores and private dark rooms now that peace is here again.

In this NATURE MAGAZINE photographic department, we hope to give readers the latest technical data, with particular reference to Nature and scientific photography. We do not plan to go in for salon prints—just yet—because we are more interested in photography from the Nature point of view. However, whether he intends to or not, the Nature photographer often produces a picture that "has something." Thus, it is not surprising that many salon prints and breathtaking "shots" have animals or birds as their subjects.

We want to devote a portion of the department to consideration of the latest photographic gadgets, new cameras, film and other equipment that might help the Nature photographer. We hope to make the department an informal one and, naturally, we will welcome ideas and suggestions.

Now that numerous photographers' mates, technician non-coms and officers are returning to civilian life again, now that film is available—and Spring is here—there is sure to be a boom in Nature photography.

Audubon Exhibit

Until July 14, 1946, a special exhibition of original water colors of birds by John James Audubon will be on display at the museum of the New York Historical Society, Central Park West at 76th Street. These drawings, numbering about 150, are the best of the originals owned by the Society. They are being exhibited for the first time since their return from war storage, and constitute the largest and most comprehensive showing of Audubon's water colors since his death in 1851.

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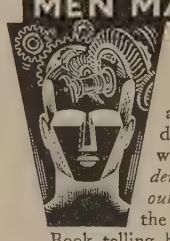

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RAMPANT RIVERS

(Continued from page 184)

hold the soil and to check the forces of erosion. The forest, of course, is found to be the best land-holder, especially on slopes where the run-off tends to be especially rapid.

How can the forest check erosion? First, its canopy of leaves, backed by a network of twigs, branches and trunks, breaks the force of the rain so the water trickles down to the forest floor. Much of the water sinks slowly through the mat of leaves, needles and branches, and into the soil. From there it seeps gradually into springs or streams, or is used by the vegetation. On the plains a thick mat of grass serves in much the same way as the forest in checking the rapid run-off of water.

Of course, not all the land can be forest or grass-covered. Millions of acres must be plowed. There must be cleared spaces for cities and industries, for airports, highways and railroad yards. But farmers can use their lands in such a way that the smallest possible amount of erosion is permitted, which is the major work of the U. S. Soil Conservation Service.

As long as the rains fall and the snows melt, there will be times when they cause the temporary unbalance of Nature that comes with too much water. But man can arrange so that much of the water will be checked as it falls or conducted away in an orderly manner.

Waterpower is a major factor in the wealth of a nation and, like all chained giants, it needs constant watching. Rampant rivers can be tamed, but, docile as they may seem in captivity, they will go wild again if they are given the opportunity.

AT THE FEET OF GIANTS

(Continued from page 190)

a creeper, traveling by rooting at the stem tips. When the foliage is pressed it sends out a delicious aromatic fragrance. The flower is small and white, but that does not seem to matter—everyone loves it just the same. Here, perhaps, is the place to say something about a redwood plant with a bad smell. It seems all wrong that any plant of the lily family, or one having such handsome leaves as *Scoliopus bigelovii,* should be plagued by so evil an odor. The smell is strongest in the green-purple, orchid-like flower that cowers beneath forest litter. The leaves, all mottled with dark green-brown, and popular with the thick, dull-golden, five-inch redwood slugs, are carried in pairs, and the deep ribs on the under side come out on top as decorative veinings.

The heath family is well represented among the redwood flora. Beside the magnificent madrona tree, *Arbutus menziesii,* with its thin, mahogany bark peeling to reveal the polished green beneath, its glossy leathery leaves, its waxy white flower-urns and scarlet berries, there are two huckleberries, one with red berries and one with black. There is splendid salal, *Gaultheria shallon,* with rich leaves and a delightful translucency to its alabaster urns.

The two shrubs that draw most tourists up the coast highway are western azalea, *Rhododendron occidentale,* and *R. californica.* The first may reach fifteen feet; its flowers range from white to light pink, always with a yellow blotch on the upper lobe. The customary rose-purple colored one sometimes becomes a small tree. These shrubs make stunning May and June displays.

Fallen logs, ancient stumps, cavities where the whole root system of a redwood has been pulled loose by storm and stood on end, tend to give an uneven contour to the mosaic of leaves and flowers that surges across this tempting surface. Spurred on by warm humid air, and an endless supply of the rich humus, plant life soon transforms fallen trunks into moss-covered seedbeds for little redwoods, huckleberries and ferns. Such seedbeds are usually embellished with an assortment of red or orange mushrooms.

Old stumps may be taken over by the chaste white windflower, *Anemone deltoidea.* A quilt of lesser ground-covers is pierced by little bushes of the charming cerise redwood rose. There may be seedlings of barberry, thimbleberry, meadow rue and *Trillium ovatum,* and the fleshy roots of a pink-flowered dutchman's breeches, *Dicentra formosa,* often joins the army of plants that marches beneath the redwoods. The flowers of *Clintonia uniflora,* a low-growing species in the northern redwoods, are pure white, but the flower clusters of *C. andrewsiana,* held high above distinguished-looking leaves, are bright pink and followed by exquisite berries of lapis-lazzulé blue. Perpendicular cuts left by road makers soon become peppered with myriad plant babies, and from the upper edges of some of these banks, curtains of twin-flower, *Linnaea borealis,* fall to drape the surfaces.

The joy of all of this sweet surging of small plants and rank bushiness of taller ones is intensified for me by the goings on of birds and beasts. Early morning and night time bring the light, cautious tread followed by the effortless leap of deer. In the spring a robins' chorus ushers the day in, and out again. Squirrels chatter, thrushes utter their flute-like notes, always coming from a little distance, never from overhead. One night it was late when I put down the sleeping bag, spreading it close to a tall evergreen huckleberry. In the morning, before I was fully aware of my surroundings I sensed a particularly busy humming bird above my head. Pulling my wits together, and my body out of the bed roll, I concentrated on this mite of active feathers. There, in the crotch of the huckleberry bough above my bed was the tiny nest-cup, its interior squirming with two infinitesimal infants.

KEEPING EFTS AND NEWTS

(Continued from page 191)

later time, depending on how thoroughly the housekeeper's activity extends to obscure nooks, shriveled and dessicated forms may be brought to light to solve the mystery of disappearance. Salamanders cannot long survive unless their skin is kept from drying out.

If one has a suitable glass "vivarium" or "terrarium," whatever it may be called, evets can be kept in it and will be interesting and pretty creatures to watch. Inside such a glass case one can indulge his ingenuity in making a miniature garden. By using mosses, small ferns, or other woodsy plants that bear flowers and berries, and with stones and lichen-encrusted sticks, something really pretty can be produced. The efts will be satisfied to make their lair underneath the stones or buried sticks, and at night they will come forth and be active. They are not timid and can be watched by artificial light.

The problem of feeding them is not an easy one. They can be gotten to eat small flies, bits of liver, scraped raw meat, minced earthworms, and the like, offered with tweezers, or on the end of a wire, and wiggled attractively and with great patience before their eyes. Insects, if too active and agile, cannot be caught by these slower-moving salamanders and escape from the vivarium, but insects such as wingless plant lice and others that remain obligingly quiet and within reach readily fall victims. The salamander, with stealthy movements of a cat stalking its prey, slowly approaches to sure striking distance, then, with a flash, the long tongue darts out and seldom misses its prey.

We solved the feeding problem quite satisfactorily by a method that may help others who may have salamanders or other such small animals to feed. One of the stock materials of many biological laboratories is the fruit-fly, *Drosophila.* It breeds readily in artificial cultures of agar or bananas, and reproduces itself in large numbers by brief generations. Numerous varieties of this fly have been isolated and used for research in experimental genetics. Several varieties occur that are characterized by atrophied or vestigial wings. These make ideal food for small animals in a vivarium as they are easy to handle by both the propagator and the live-stock. They can readily be propagated in any numbers by the ordinary laboratory technique.

ANNUALS, GAY AND COOPERATIVE

(Continued from page 211)

loveliest of all flowers, but unfortunately are subject to insect-borne diseases. The resistant strains are best, but if you want to grow really fine asters it is almost necessary to enclose them in a cage of mosquito netting. Some folks have good luck with asters grown without any precautions; I do not.

Chinese forget-me-not, *Cynoglossum*, is as blue as the real thing, hardy and easy to grow, and a real asset to any border because of its color. It sometimes seeds itself, another point in its favor.

Every farm yard in Pennsylvania, and in some of the other older farming states, is host to the old favorite, snow-on-the mountain, a member of the euphorbia family. The pale green leaves contrast with the white leaflets surrounding the inconspicuous flowers. It is a useful plant in dry, rough places, as a background for other flowers, and it will outlast anything else in a vase. Personally, I like its color, form and habit, but to some it is coarse and commonplace. The milky juice is sticky as the milkweed.

Time was when every sensitive soul would sniff whenever a bed or border of bright red salvias hove into view. I am not that allergic to bright colors, and rather like them in their place. Now, however, we have salvias in white, blue and pink shades, and they blend well with other flowers. Welwyn is the name of new introductions, said to be very fine.

Another tall plant that is handsome but that used to be rather looked down upon because it was coarse and given to self-seeding is the spider-flower or cleome. Giant Pink Queen, All-American in 1943, is distinctly better because it is more compact; the flowers a clear bright pink and borne in tremendous heads. Try it.

Distinctly oriental in rich colorings, of moderate height and good form, the attractive *Salpiglossis* is one of the loveliest flowers that grows. Sometimes difficult, unless started in a cold frame, this beauty deserves more attention than it receives.

If you have never grown dahlias from seed, it is quite easy and good fun. They will bloom the first year, but must be started indoors. The range of colors and forms will amaze you. Chrysanthemums can be grown the same way, and you may get some really good ones, especially in the hardy Korean single class.

Portulacas I have already mentioned, but do not overlook them. The singles are finer to me, but that is a matter of taste. These dwarf sun-lovers come in an amazing range of gay colors. The seed is fine as pepper and should not be covered. They will grow in a dry rockery, in cracks in a blank walk, almost any place where they can get a root hold.

This does not exhaust the annual list by any means, in fact it hardly skims what to me is the cream. I have not mentioned scabiosas, good old favorites and useful for cutting; or the sunflowers, which belong in any large garden. The shorter forms come in lovely shades of brown, red and yellow, and the seeds, being smaller, are attractive to finches and other birds. And then there are the sweet peas, well worth the trouble of growing them.

Last but not least in this brief outline of the annuals come the morning glories. Many an old doorway has been made into a shrine of beauty with a planting of Heavenly Blue, the most perfect name ever given a flower. Pearly Gates is a good one, too, and so is Scarlet O'Hara, if you must have red—or red, white and blue. My own taste runs to blue in morning glories. No garden is so humble or too haughty to include these old flowers.

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EDEN AT BELTSVILLE

(Continued from page 205)

to hasten decay of some apples. These fruits were infected with "scald," a brown discoloration that gradually deepens. It does not appear until the apples have been in cold storage six weeks or longer. It is worse in cold storage than in cellar storage. The disease is not fully understood, but it was found that a probable cause were the acetaldehyde and various esters that emanate from the apple.

Since apples in commercial storage are tightly packed, these odorous vapors become concentrated. Better aeration helped, but could not be obtained in tight packing—a feature necessary in commercial storage. Various absorptive materials such as charcoal, vegetable oils, animal fats and oiled paper were used. The last was most practical. It stopped the scald and was economical. It made possible the sale of apples the year around. The oiled wrappers developed at the Bureau's cold storage plants saved apple growers $2,000,000 a year. Yet the research involved cost only $25,000. Once again a little money given to science hit the jackpot for an industry.

It is impossible to estimate how greatly agricultural science contributed to America's vast war program. Perhaps the best way to estimate is to recall that no American serviceman went hungry in any field of action from the beachheads of Normandy to the cliffs of Okinawa. Feeding that army of men and women was the greatest attainment of agriculture in the history of sun and soil and plowshare.

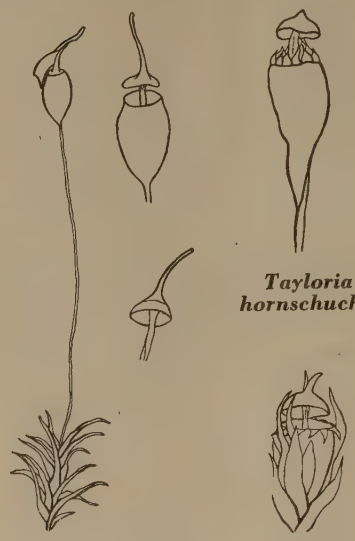
Now, with most of his servicemen back in their well-fed homes, Uncle Sam again turns to his scientists and farmers. They must help feed the hungry millions in Europe and Asia whose farms and orchards were scorched by war. Food helped win the war. Tomorrow it may well write the peace.

Reduce Wolf Population

Fifteen of the wolves of the population of between forty and sixty estimated to remain in Mount McKinley National Park, Alaska, will be eliminated systematically on direction of the Director of the National Park Service. This move is being made on the basis of studies that show a decline in numbers of Dall sheep in the Park. There is no conclusive evidence that the decline in the sheep population is due to wolves, but it is felt that, whatever the cause, the present number of sheep is dangerously low! It is believed that increase of these interesting animals can most safely be assured by control of the numbers of their potential enemies, thus establishing a sounder ecological proportion between the two mammals involved.

A MOSS FOUNTAIN

(Continued from page 192)



Tayloria hornschuchii

Gymnostomum recurvirostrum

Grimmia apocarpa

mits, *Tayloria.*

The teeth around the mouth of most mosses are hygroscopic in such a manner that they bend in moist air and close the urn. In dry air they open and allow the spores to fall out when they can most readily be blown about far and wide. This protective adjustment is achieved by *Gymnostomum recurvirostrum* in that the urn and operculum swell with moisture so as to bring the lid down closely on the urn. Thus this moss gets along very well without teeth.

Gymnostomum produces capsules very sparsely—mostly not at all. When it does the capsule is plump and round, of a dark, lustrous, chestnut-brown color, smooth and firm. The brownie-cap that it wears is a bit impish.

The capsule is about 1/25-inch long, and its stalk 1/3- to 2/5-inch. Living leafy stems are rarely more than 1/5-inch tall. But the old dead parts below are said to be as much as four inches long. That is, the sods and lumps of the moss on shady cliffs, hard with lime-tufa, may be four inches deep, the accumulation of many years. In that case, may not the stems on the fountain at Springfield be a foot long? The tufa is fully a foot deep. And no storms of sleet and ice assail it to break off fragments.

Unfortunately *Gymnostomum* has no vernacular name. We cannot call it tufa moss, for *Didymodon tophaceus,* which looks and grows much like *Gymnostomum,* has a claim on the word tufa (tophaceus). And *Cratoneuron* really makes big beds of tufa—so big as to become a topographic feature of the landscape. So if we must speak English we may say "naked-mouth rock moss" for the moss of the Springfield fountain.

We hope that this natural curiosity will be maintained. I would put it in any official list of "Things to See in Ohio."

DEEP IN THE GREAT DISMAL

(Continued from page 208)

as he called his dogs—it all seemed like some ancient land of fairies.

Reluctantly we turned back. Time seemed to stand still here, with all the world at peace. But we knew we must move along if we were to see the rest of the lake. Back to the mouth of the ditch we paddled, and on along the edge of the lake, stopping now and then to investigate the strange and beautiful things we passed.

We studied a Geological Survey map as we went. The names were fascinating, as place names so often are. Washington's Ditch drew our attention. This canal was surveyed and laid out by George Washington, as part of a project for draining that section of the rich swampland so that it might be used for food crops. This section of the swamp was part of his Virginia estates.

As we went on along the edge of the lake, a great cypress, hollow for its entire length, drew our attention. It lay near the edge, uprooted in some great storm of ages past. We can never say the "shore" of this lake. Land and water blend and merge into a strange no-man's land of stumps and cypresses, and tiny islands, overgrown with tangled vines. There is no beginning and no ending of the water. It twists and reaches in among the trees, and so we seem always to be in a bowl that is lowly overflowing in all directions, and we expect momentarily to have a great tidal wave well up under us, and carry us over the edge. But it never happens.

On we paddled, among the great stumps. A movement caught our eyes; a slow, gliding creature on a hollow stump, about shoulder-height above the water. We slowly maneuvered the canoe, close, but not too close. It might be a copperhead. We have seen many snakes, but they have been like the birds—not sufficiently in the open to permit us to identify them. They were close enough, goodness knows! One, four feet long, nearly dropped into our sixteen-foot canoe, as we edged in under some overhanging willows to make room for a passing motorboat in the Feeder Canal.

Cypress Cove, as we called it, enchanted us. Great twisted boles, with earth and vegetation resting on their patriarchal knees, rose high above our heads. The soft green needles were almost hidden in the drooping, gray-green Spanish moss, while occasionally a scarlet flame would gleam in the branches—the bright leaves of the Virginia creeper.

The day was almost over. How we hated to see the hours pass! Months in that enchanted fairyland would not have been enough. Back over the lock, and out through the feeder canal we went, after many a (Continued on page 224)

Under the Microscope

By JULIAN D. CORRINGTON

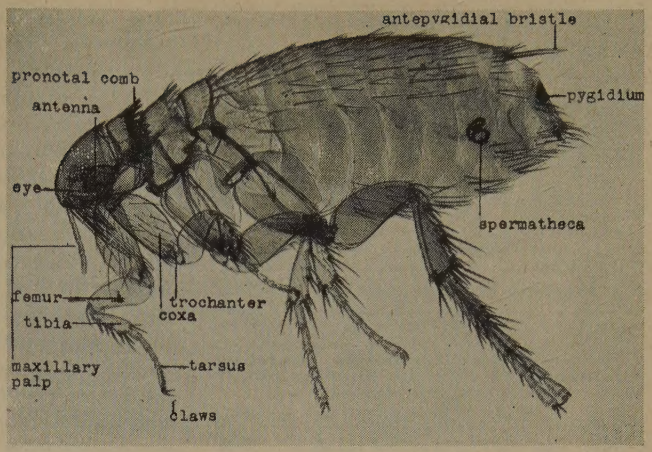
THE PHOTOMICROGRAPHS FROM SLIDES COURTESY OF WARD'S NATURAL SCIENCE ESTABLISHMENT

THE FLEA—MIGHTY MORTICIAN

HAVE you ever tried the interesting and entertaining mental exercise of looking at a given subject from as many points of view as possible? The results are often quite amazing and unexpected. Take the lowly flea, for example. To the zoologist, fleas present one of the most marvelous examples of perfect adaptation to a highly specialized environment anywhere to be found. To the physician they mean the dreaded bubonic plague; to the historian, the awful pandemics of this black death that have shaped the destinies of millions of people. To the average person they are some sort of tiny creature, details unknown, that infest beggars and domestic animals; to the farmer, a serious pest on his livestock; while to the dog they represent an ever-present torment, which no amount of clawing, biting, and rolling will completely eradicate. David Harum said, "A reasonable amount of fleas is good for a dog. They keep him from broodin' on bein' a dog." We may safely assume that our canine friends would howl down this interpretation!

The youngster with his miniature microscope cuts his scientific eyeteeth on simple whole mounts—butterfly wing scales, textile fibers, the foot of a fly, and a flea. When he examines the flea slide, he puts his foot on the first rung of the ladder of microscopical history, since fleas were among the original objects on which the simple microscope was turned in the Middle Ages; indeed, these instruments were known as "flea glasses", *Vitrea pulicaria,* and several hundred years were to elapse before the novelty of these toys wore off and scientists began serious investigations with the compound microscope.

The average microscopist has read a discussion of flea architecture, and we do not intend omitting that division of the subject here; but there are other aspects of the topic, as we shall see. Fleas consitute a small order of insects, the Siphonaptera (siphon, sucking, referring to the mouthparts, and aptera, wingless) with only about 900 species, but the number of individuals may be astronomical; Essig estimated 500,000 fleas in a single hog's nest! They are one of the most compact of natural groups, all of them showing the chief features: small size, from 0.8 to 5 mm.; tan to brown or nearly black in color; strongly compressed body (flattened from side to side), a unique char-

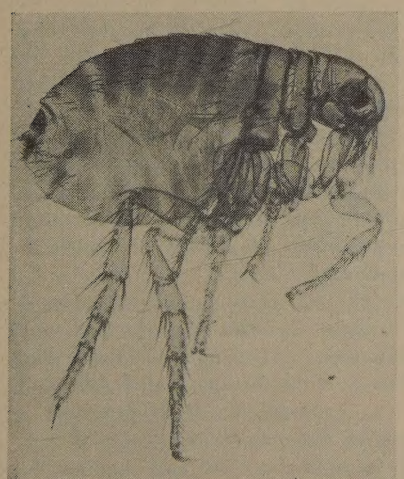


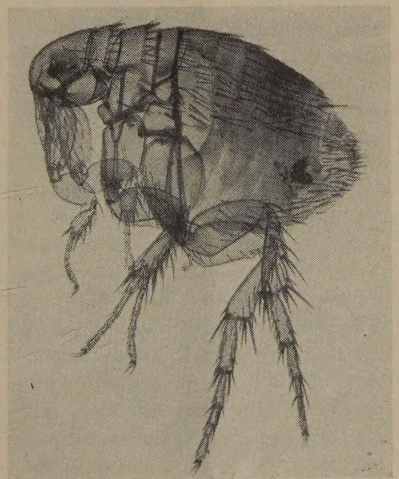
European rat flea, *Nosopsyllus fasciatus,* 50X. All four examples shown on this page are females.

acteristic; a very tough, shiny, and heavily chitinized integument, so that when caught between the teeth of a host animal, they usually slip or spurt out like a watermelon seed from between the fingers; backwardly-directed hairs, and spines or combs or both, that permit these little brownies to glide forward with ease through a dense coat of hair, but prevent rearward movements and assist in anchoring the insect firmly when the host scratches or takes a vigorous shake; sucking mouthparts; enlarged legs for leaping; no wings; and complete metamorphosis, the larvae being termed maggots.

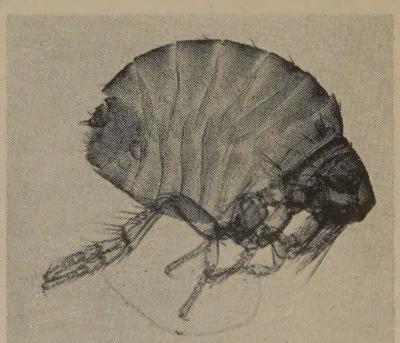
Fleas are generally considered as the most highly-evolved of all orders of insects, standing at the end of this immense line, and to have arisen from the flies through loss of wings and profound specialization as external parasites. Only birds and mammals are attacked, all other groups being spared the annoyance and danger of these pests.

In our labeled illustration, note first the eye; this is a simple eye, fleas never having compound eyes as do most insects. There are no ocelli and some fleas are completely eyeless. The antennae fold back into grooves in the sides of the head, behind the eyes. If an enlarged row of heavy spines is present along the bottom of the cheek, it is termed a genal ctenidium or comb; if along the hind margin of the head, a pronotal ctenidium; some fleas have both, some one, some none; they help hold the flea in place when taking a blood meal. The legs, at first sight, appear to have an extra segment, but this is due to the fact that the coxa, usually small, is greatly enlarged, becoming in fact the stoutest of all. There follows a small trochanter, then femur, tibia, and tarsus of five segments, with a pair of claws and a basal pad. The spermatheca (receptaculum seminins) of the female is a sperm-storing organ and is chitinized and shows clearly through the body wall in cleared speci-





Left to right, human flea, *Pulex irritans,* 45X; plague flea, *Xenopsylla cheopis,* 50X; sticktight flea, *Echidnophaga gallinacea,* 65X.



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mens. The pygidium is an area covered with small bristles and is probably sensory in function.

The mouthparts are formed for piercing and sucking, and consist of the labial, palpi, grooved and fitted together to make a sheath, within which are the sword-like mandibles and spear-like labrum. The maxillae are triangular plates, each with a spine as its tip, used in holding the head of the flea in place while feeding. Their four-segmented palpi, often mistaken for antennae, are sensory and feel out the site to be punctured. Males and females are readily distinguished by their shape, which reflects differences in their complex external genital organs.

The majority of fleas drop their eggs at random in the host's hair, whence they fall or are shaken off, accumulating most numerously in burrows or lairs, where the hosts sleep. The eggs hatch into maggot-like larvae, without eyes or appendages. The head is brown and heavily chitinized, with biting mouthparts; the body white, more or less transparent, and generally cylindrical. These worm-like creatures are non-parasitic, feeding on both animal and vegetable debris and on the feces of adult fleas, whence they obtain a certain amount of host blood, said by some investigators to be essential in their diet. After two molts, a flea larva spins a silken cocoon, in which the pupal stage is passed, the adult emerging after a few weeks or months. The entire life cycle may take from three weeks to several months, depending on the species, temperature, and other environmental factors.

Commonly available for study are the dog flea, *Ctenocephalides canis,* and cat flea, *C. felis,* nearly worldwide in distribution, and with both genal and pronotal combs. These two species readily attack man and constitute a serious nuisance, often producing a dermatitis, though they do not normally transmit diseases. Sometimes children become infected with the dog tapeworm, *Dipylidium caninum,* whose larval stage is passed in these insects and, during epidemics, these fleas may pass bubonic plague from person to person.

Pulex irritans is the human flea, a cosmopolitan species primarily a parasite of man but also frequenting carnivores and occasionally rodents and swine. Fortunately this flea does not usually transmit disease. It has neither genal nor pronotal combs, and has much smaller antepygidial bristles and spermathecae than the somewhat similar *Xenopsylla cheopis,* the plague flea, or Indian or tropical rat flea, one of the greatest of all insect enemies of mankind.

The European rat flea, *Nosopsyllus fasciatus,* can transmit plague, but is not important; and the ground squirrel flea, *Diamanus montanus,* of the western United States, is an active transmitter from rodent to rodent and would be a most terrific problem if it ever took to biting man, an uncommon habit with this species. The sticktight flea of fowls, *Echidnophaga gallinacea,* infests the head, comb, and wattles of domestic fowls and heads of wild birds and is a serious economic pest. This and the following species present a telescoped thorax, no combs, and small legs, as they remain permanently attached to the host and hop but little. *Tunga penetrans,* the chigger, chigoe, jigger, sand flea, or burrowing flea, digs into the flesh of its victims, chiefly cats, cattle, sheep, horses, pigs, rats, birds, and man. In South America this flea is a dangerous parasite that burrows into the skin of many parts of the body, but prefers a site under the toenails of barefoot persons. The impregnated female swells up enormously, the abdomen distended by eggs until it may reach the size of a pea. The cavity occupied by the flea ulcerates, with painful swelling and inflammation, and frequently becomes secondarily infected with bacteria, not uncommonly resulting in loss of toes or even of the entire foot. Tetanus and gas gangrene are common, and deaths not unusual.

"Trained" fleas are, of course, a fallacy, since training, other than conditioning reflexes, requires intelligence on the part of the animal; but the leaps that some fleas can perform are no less remarkable for being unreasoned. Mitzmain, as cited by Chandler, observed a *Pulex irritans* making a jump 13 inches in length by 7¾ inches in height; an equivalent leap for an average man would carry him 275 feet up into the air while traversing 450 feet horizontally—truly a Superman performance!

All of the many interests we may find in fleas, however, are overshadowed by their medical importance. Bubonic plague, the awesome "Black Death" of medieval Europe, carried off about one-quarter of all the peoples of that continent in the Fourteenth Century alone, or about twenty-five million victims. Other outbreaks dot the pages of history and the disease lurks in many sections of the world today. Using, in the following account, terms from a vocabulary of parasitology appearing elsewhere in this Department, the great pandemics of plague that have ravaged nations in the past were not understood and were naturally regarded with the utmost of superstitious terror. Any possibility of untangling the complex epidemiology of this scourge had to await the invention of microscopes, the discovery of bacteria, and of the role played by arthropods in disease transmission.

In 1894 the pathogen was discovered and named *Bacillus pestis;* later the generic name was changed to *Pasteurella,* in honor of the famous French father of modern bacteriology. It is generally a short rod, but may occur in many shapes, and is gram-negative and non-motile.

The natural hosts and reservoirs of this bacillus are rodents of numerous species. Classic European plague and the present-day tropical plague are termed *murine plague* with reference to their widespread incidence among various species of rats (Family Muridae), and the chief vector is the rat flea, *Xenopsylla cheopis.* This species, unfortunately for mankind, transfers readily to man when great numbers of its normal murine hosts die during an epizoötic. The usual method of transmission of the disease, from rat to rat, or rat to man, was not discovered until 1914, when it was observed that *Xenopsylla,* in feeding on an infected animal, had its digestive tract completely blocked by solid growths of the bacteria. Such fleas, said to be *blocked,* cannot draw in more blood and in trying to do so, regurgitate plague bacilli into the victim. Among all the species of fleas studied, only *Xenopsylla* and *Diamanus montanus* were found to become easily blocked, hence these fleas are the actually important vectors, and other species are minor or incidental.

Endemic murine plague slumbers on in many tropical parts of the world today, with a respectable annual death toll. The temperate regions are outside the range of *Xenopsylla cheopis* and, should an epidemic occur, it fades out with the advent of cold weather and death of the fleas. We are prone to think of this disease as far away and of no immediate concern. However, in 1900, plague made its first appearance in the Western Hemisphere, when the body of a Chinese, dead with plague, was picked up in a hotel in San Francisco's Chinatown. By 1904 there had been 121 cases and 113 deaths, certainly something to reckon with! It was thought that the disease then died out, but it flared up again three years later, after the great fire. Intensive research established the fact that the wild rodent population of this district had become infected and constituted reservoirs. Fleas had transferred from dead house rats on the outskirts of the city to such wild and native rodents as the ground squirrel, then the common flea of this animal, *Diamanus montanus,* spread the bacteria from squirrel to squirrel. Subsequently, other parts of California and as many as nine other western states were found to harbor infected wild rodents. This endemic form of our West, now thoroughly established, is distinguished as *sylvatic plague* (sylvan, rural). It may transfer back to house rats wherever the two kinds of rodents happen to come in contact, and then would require only the presence of *Xenopsylla cheopis* to initiate a human epidemic.

Thanks to the constant vigilance of federal public health forces, this country has never had and probably never will have a great pandemic of plague. Intensive and voluminous research has uncovered apparently all essential facts in the epidemiology of this disease, and what is known and understood can be controlled. But, as Chandler remarks, "Having sylvatic plague in your suburbs is like having rattlesnakes on your golf course or a Typhoid Mary in your kitchen. It is an unpleasant threat." An infected *Xenopsylla* can live apart from its host for some two weeks and can be transported in stored food products, so that seaports and airports need continuous supervision. The lad hunting ground squirrels with his rifle can acquire the disease by direct contact with the killed rodent, and the pneumonic form of plague can be passed from person to person without the intervention of vectors. And so we will probably always have to reckon with plague, at least in the form of sporadic outbreaks and minor epidemics.

Chargeable to our account against fleas, principally *Xenopsylla,* in addition to a gradual spread of plague from the West, is an equally insidious encroachment of typhus from the South. While epidemic typhus is louse-borne, endemic or murine typhus is flea-borne, and is widely established in the United States, notably in Texas and Georgia. Fleas occasionally transmit a number of other less common diseases and serve as the intermediate hosts for several species of tapeworms. Indeed, the importance to man and to human civilization of these tiny pests is out of all proportion to their size. Insignificant as animals, they are a powerful aid to the casket industry!

SOURCES for further reading: Chandler, A. C., *Introduction to Parasitology,* Wiley, N. Y., 1944. Essig, E. O., *College Entomology,* Macmillan, N. Y., 1942. National Research Council, *Manual of Tropical Medicine,* Saunders, Philadelphia, 1945. Smith, Geddes, *Plague on Us,* Commonwealth, N. Y., 1943.

VOCABULARY FOR PARASITOLOGY AND PUBLIC MEDICINE

PARASITE—an organism that lives with and at the expense of another species. Example, the plague flea, living on and drinking the blood of rat or man.

FREE-LIVING—not parasitic. The latrine fly is ordinarily a free-living insect.

ECTOPARASITE—one living on the exterior of the body, as a flea.

ENDOPARASITE—one living within the body, as the plague bacillus.

FACULTATIVE PARASITE—an organism that may be either free-living or parasitic, as various types of fly larvae sometimes found in the human intestine, including the latrine fly, *Fannia scalaris.*

OBLIGATE PARASITE—one so adapted that it is compelled to lead only the parasitic life, as a flea.

INTERMITTENT PARASITE—one that spends only part of its time on the host, as a mosquito.

LARVAL PARASITE—one parasitic only in its larval stage, as the redbug or "chigger", a harvest-mite. The adult is free-living.

ADULT PARASITE—one parasitic only in its adult stage, as the flea, the larvae of which are free-living.

PERMANENT PARASITE—one spending its entire life cycle with the host, as most species of lice.

MONOGENETIC PARASITE—one with a single host species for both larval and adult stages, as the roundworm, *Ascaris.*

DIGENETIC PARASITE—one in which the larval and adult stages are passed in two different host species. The beef tapeworm of man spends its larval period in cattle, its adult life in man.

HOST—the organism parasitized. Man is host to all of the foregoing examples.

INTERMEDIATE HOST—that infested by the larva of a digenetic parasite, as the flea, *Xenopsylla cheopis,* is an intermediate host for the larva of the tapeworm, *Hymenolepis diminuta,* rat and man harboring the adult worm.

FINAL OR DEFINITIVE HOST—that infested by the adult parasite, as man in the preceding example.

NATURAL HOST—the normal victim; one accustomed through long ages to harboring the parasite; frequently so adjusted to the invader that injuries are tolerated and of minor extent. Man is the normal host of the flea, *Pulex irritans.*

ACCIDENTAL HOST—one not the normal host. Not being adapted to the parasite, the effects are often far more severe than those of the same infestation in the natural host. Man is an accidental host of the plague bacillus, *Pasteurella pestis,* and of the plague flea, *Xenopsylla cheopis,* both normally parasites of rodents, hence plague ravages mankind severely.

HOST-PARASITE RELATIONS—adaptations and reactions between the two associated organisms, as specificity, immunity, and toleration.

HOST SPECIFICITY—adaptation of a parasite to a particular host species, or more often to a related group of species. Plague is a rodent disease and does not attack cattle, for example, these animals being only feebly susceptible.

NATURAL IMMUNITY—incompatability between a potenial host and parasite, preventing infection. Man does not contract bird malaria, though constantly bitten by infected individuals

of the common house mosquito, *Culex pipiens,* vector of this disease to birds.

ACQUIRED IMMUNITY—repeated infections commonly raise host resistance so that further attacks come to have little effect, as in chronic malaria.

ARTIFICIAL IMMUNITY—that conferred by vaccines and sera, as for smallpox.

EPIZOOTIC—an outbreak of a communicable disease among animals. This occurs in the rodent population preceding all great pandemics of plague.

ENDEMIC (*"in the people"*)—a disease constantly present in any one place, as plague is endemic today in India.

SPORADIC—occasional cases of a disease breaking out now and then, as a sporadic case of plague in New Orleans.

EPIDEMIC (*"on the people"*)—a widespread outbreak of a disease at some one time or periodically, as the epidemic of plague in San Francisco in 1907, following the great earthquake and fire of 1906.

PANDEMIC (*"all the people"*)—a continental or worldwide eruption of a disease, as the pandemic of plague in 14th Century Europe.

PATHOGEN—a disease-producing organism. An example from each main group includes: the virus causing rabies, the rickettsia producing typhus, the bacterium, *Pasteurella pestis,* causing plague, the fungus causing ringworm, the protozoan causing malaria, the worm producing filariasis, and the flies that bring about intestinal myiasis.

RESERVOIR—the natural host of a disease, harboring the pathogen in its blood or tissues. Rats are reservoirs of plague bacilli, from which they may be transferred to man by fleas.

VECTOR—the transmitting agent of a disease from one host to another, as from a reservoir to another reservoir, or from a reservoir to an accidental host. In plague, the flea, *Xenopsylla cheopis,* is the most important vector from rat to rat or from rat to man.

CARRIER—a person with an ambulatory (walking) and arrested case of a communicable disease, manifesting no symptoms, but capable of transmitting the pathogen to others. Typhoid and amoebiasis are diseases in which carriers are an important public health problem. Carrier is often loosely and incorrectly used for vector, as the flea is a "carrier" of plague.

ETIOLOGY—the science of cause; in pathology, the investigation of causes of a disease. The etiology of plague was a mystery for ages, but was solved in 1894 when *Pasteurella pestis* was discovered independently by Yersin and Kitasato during the great Hong Kong epidemic.

EPIDEMIOLOGY—the public health aspects of a disease; how it erupts into epidemic proportions, environmental factors and, especially, identification and control of reservoirs and vectors.

PATHOLOGY—in general, the science of disease. Specifically applied, as in the pathology of plague, a description of the nature and varieties of the disease and what it does to the tissues and organs.

CLINICAL CHARACTERISTICS — the picture that the disease presents to the physician. In bubonic plague the chief clinical characteristics include abrupt onset, chill, high fever, rapid pulse and respiration, mental dullness and anxiety, nausea, constipation, and the appearance of swellings termed buboes.

CULTURAL CHARACTERISTICS — the picture presented to the bacteriologist or parasitologist in growing the pathogen under a wide variety of conditions; the temperature at which the organism will thrive, whether or not it will grow in agar, in milk, in sugars, and in laboratory animals, as guinea pigs. These experiments and standing reactions may be essential for a positive identification of the pathogen.

DIAGNOSIS—separation of the disease from similar pathological conditions by means of the clinical characteristics, laboratory examination of blood, pus, sputum, urine, etc., and, above all, finding of the pathogen in lesions, body fluids, or excreta, and the positive identification of this pathogen by its cultural characteristics. In its early stages, plague may be confused with typhus, malaria, relapsing fever, and other diseases; diagnosis should make the specific identification positive.

PROGNOSIS—forecast of the outcome of a disease. In epidemiology, prognosis refers to statistical probabilities. In plague, the pneumonic and septicemic forms are 100% fatal, while the commoner bubonic form has varied from 60 to 90% mortality in different outbreaks.

THERAPEUSIS—methods of curing a disease; remedies of every sort. In plague, treatment is largely by chemotherapy, —curing by use of chemicals, as sulfadiazine.

PROPHYLAXIS — prevention. In epidemiology the chief measures are isolation of the sick, immunization of the healthy by sera and vaccines and, of greatest importance, sanitation. In plague, victims are isolated under strictest aseptic precautions, exposed persons are vaccinated, and an intensive rat and flea eradication campaign is waged.

THE ANSWERS TO "SOUND YOUR VOCABULARY"

1-3-2; 2-9-15; 3-6-8; 4-16-3; 5-7-5; 6-15-6; 7-14-7; 8-12-14; 9-13-16; 10-11-13; 11-4-1; 12-8-11; 13-1-4; 14-10-12; 15-2-10; 16-5-9; 17-17-17.

DEEP IN THE GREAT DISMAL

(Continued from page 220)

heartfelt "thank you" to the lock-keeper and the captain for their assistance.

Two stops were made on the return trip—two real stops, that is, not counting the million times I called, "Oh, wait a minute—I must see that flower!—or that berry!—or that fern!" Once we came to an abrupt halt as we saw great salt-water oyster shells, in the canal bank. We live in the Chesapeake Bay country, and we know big oysters, but these were giants—left by that prehistoric sea, for present generations to see and marvel at.

The cane brake brought us to another halt—a sea of green, like ocean water in a calm, at sunset time. A glorious cool, soft green it seemed, but we knew the sharp-edged cane would cut skin and clothing to shreds. Like an immense cornfield, it stretched into the distance in a part of the swamp that had been cleared by fire.

Back we came, to the waiting car. Goodbye to our canoe and our freedom. Back to the busy, bustling world, noisy, warring, and full of unrest. Months have passed, but still we dream of the quiet peace, the green beauty and the brown waters of the Great Dismal. The enchantment lingered, although the trip has ended.

Plant Discoveries

Returning from eleven months of plant exploration in Mexico, E. J. Alexander, an assistant curator of the New York Botanical Garden, brought back some 2400 herbarium specimens. A number of these will be new to science and increase knowlelge of Mexican flora. He also brought back live propagating material expected to make important additions to horticulture. This includes a red-flowered lobelia, twelve feet tall; morning glories with flowers of royal purple, lilac, rose-purple and buff-yellow; a rich, blue-flowered salvia; a passion flower with highly ornamental red fruit; a famous hand-flower tree, extremely rare in cultivation.

For Fishermen

Upstream and Down. By Howard T. Walden II. New York. 1946. The Macmillan Company. 367 pages. Illustrated by Milton C. Weiler. $3.00.

This is a book for fishermen, particularly those who love the outdoors fully as much as they enjoy the thrill of hooking a fighter in the stream. This is really a collection of essays on fishing, originally published in a limited edition and now available for a wider audience.